SCIENCE GOSSIP.

HARDWICKE'S

SCIENCE-GOSSIP

For 1872.

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Science-Gossip:

AN ILLUSTRATED MEDIUM OF INTERCHANGE AND GOSSIP

FOR STUDENTS AND

LOVERS OF NATURE.

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

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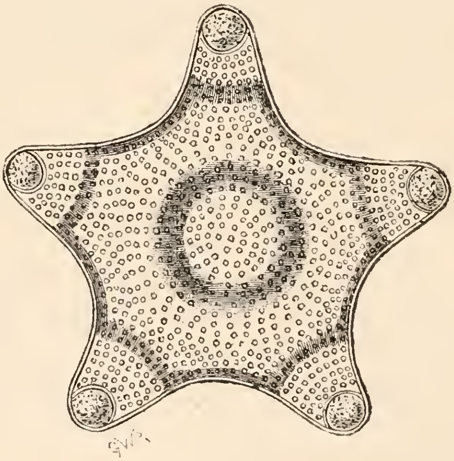
THE Editor can hardly realize the fact that twelve months have elapsed since he undertook the responsible duties of conducting this Magazine. To step into the vacant chair of so able a predecessor might well have deterred a bolder man. There were new friends to make, old friends to get acquainted with,—and SCIENCE-GOSSIP could boast of a large circle. The months were to bring with them hosts of queries, some of them any but patient ones, and requiring information that was all but omniscient!

But it was not long ere we felt that in the sheer love of Science we had a strength that might be calculated upon. Supporting us were men whose names are "household words" in the departments of science they have devoted themselves to, and from them we have received willing and valuable help, without which we could not have done our duty to our readers. Out of a grateful heart, therefore, on our own behalf, as well as on that of the querists who have profited by their advice and instruction, we tender to them our best thanks.

The scope of SCIENCE-GOSSIP we have not altered—believing it could not well be altered for the better. We stand between the High Priests of pure science and the humbler votaries who would know its wisdom. Our ambition is not to be esteemed learned, so much as to be deemed useful. By uniting in monthly fellowship the unassuming but ardent lovers of nature, we feel we are doing much good; by giving them the means of noting phenomena worth notice, comparing notes, and in relieving each other's difficulties, we are helping on that reign of "Good-will towards men," which this especial season brings to our minds.

We have endeavoured to do our duty—if we have failed, we crave that forbearance which men should always receive from their brethren. For any shortcomings, omissions, or faults, we implore pardon, hoping that even by these we may learn wisdom. In the strength of the experience of one short year we hope to do better. Whilst thanking our readers for many expressions of kindly sympathy and encouragement received during our "Year of Office," we extend to them the Editorial hand, and wish them most heartily

"A Happy New Year!"



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SCIENCE IN THE TENTH AND TWELFTH CENTURIES.

By F. KITTON.

SCIENCE in the tenth century! the reader may be tempted to exclaim. What did they know of science in those dark ages? Compared with the knowledge of a charity-school boy of the present day, it must be admitted that scientific knowledge at that period was small indeed. It is popularly supposed that the *clergy** were desirous to keep what knowledge they possessed to themselves. This, however, is not the fact; the dense ignorance of the mass of the people, and the limited means of diffusing knowledge, rendered instruction of any kind both expensive and difficult.

The specimens of popular science I am about to introduce to your notice are taken from MSS. that must have attained a certain amount of popularity. The first is a Manual of Astronomy, of which several copies are still extant. It is written in Anglo-Saxon. The name of the compiler is unknown, and it consists mainly of a free translation of a portion of Bede's *De Natura Rerum.* The extracts are literal translations from the Anglo-Saxon. The following extract is a specimen of the compiler's Anglo-Saxon :—" Ic wolde eac gyf ic dorste pluccian sum gehwæde andgyt of thære bec the Beda se snolera lareow gesette & gaderode of manegra wisra lareowa bocum, be thæs geares ymbrenum fram anginne middan-eardes that nis to spelle ac elles to rædenne tham the hit licath."—"I would eke, if I durst, pluck some little information out of the book which Bede, the skilful master, formed and compiled out of the books of many wise masters concerning the courses of the year from the beginning of the world. This is not for a discourse, but otherwise to be read by those whom it pleases."

"Truly when the Almighty Creator created this world, He said, 'Let there be light!' and directly there was light..... On the second day God made heaven, which is called the firmament, which is visible and corporeal; and yet we may never see it, on account of its great elevation and the thickness of the clouds, and on account of the weakness of our eyes.

"The heavens incloses in its bosom all the world, and it ever turns about us swifter than any mill-wheel, all as deep under the earth as it is above. It is all round, and studded with stars. Truly the other heavens that are above and beneath are indescribable and unsearchable of men. There are, indeed, many more heavens, as the prophet said, 'the heaven of heavens.'"

The compiler proceeds to describe the remaining days of creation in similar language. His description of the sixth day's creation is scarcely in accordance with the account in Genesis. He says that God made all kind of animals, and all cattle that go on four feet, and the two *men* Adam and Eve (& tha twegen menn Adam & Efān). "On the seventh day he ended his work, and the week was then completed. Now every day in this world is the result of the sun's light. Truly the sun goes by God's command between heaven and earth by day above, and by night under the earth, so far under the earth in the night-time as she rises above it in the day. She is ever running about the earth, and so light shines under the earth by night, as she does above our heads by day. The sun is very great—broad she is,* so the books tell, as the whole compass of the earth; but she appears to us very small,

* This word had not at that period the restricted meaning it now bears; it simply meant one who could read and write.

* The sun and moon in Anglo-Saxon and most of the northern languages are respectively female and male.

because she is far from our sight. The sun is typical of our Saviour Christ, who is the Sun of Righteousness, as the prophet said, 'To the men who fear God, the Sun of Righteousness shall arise, and health is on her pinions.' The stars also, which seem to be very little, are very broad; and, on account of the great moisture which is between us, seem to our sight very small. Yet they could not send any light to our earth from the high heaven, if they were so small as they appear to our eyes.

"Truly the moon and all the stars receive light from the great sun, and none of them hath any rays but of the sun's rays; and though the sun shines under the earth at night, yet her light ascends on a part of the earth which lights up the stars above us, and when she rises she overcomes the light of all the stars and the moon also by her immense light. The moon, that waxes and wanes, is typical of the present generation in which we are. He is waxing by the children who are born, and waning by those who die. The bright stars are typical of the believers in God's congregation, who shine in good converse."

The compiler enters rather minutely into the subject of the position of the sun at various periods of the year. He then goes on to say that the night is divided into seven parts, from the sun's setting. "One of these parts is *crepusculum;* that is, evening's gloaming. The second is *vesperum;* that is, evening. The third is *conticinium,* when all things are silent in their rest. The fourth is *intempestum;* that is, midnight. The fifth is *gallicinium;* that is, cock-crowing. The sixth is *matutinum,* or Aurora; that is, dawning. The seventh is *diliculum;* that is, early morning, between dawn and sunrise. Weeks and months are known to men according to their understanding of them; and though we should describe them according to bookish meaning, it will seem to unlearned men too deep and uncommon."

Several pages are devoted to the various divisions of the calendar, and he also devotes some time in endeavouring to convince his readers that, although the moon is spoken of as new and old, and waxing and waning, still she really does not change, but that the different appearances are produced by the position of the sun. "No Christian shall divine anything by the moon; if he doth, his belief is nought. If the sun lights him from above, then he will stoop; if she lights him right athwart, then he is equally horned; if the sun lights him from below, then he inclines up. Because he always turns his back to the sun, he is so turned as the sun lights him.

"Now, say some men, who do not know this reason, that the moon turns him according as the weather shall be in the month; but neither weather nor unweather (A.-S. un-weder) turns him from that which is his nature."

Our friend now proceeds to describe divers stars.

"Some men say that stars fall from heaven; but it is not stars that fall, but fire from the sky, which flies from the heavenly bodies as sparks do from fire. [*Query,* has the present President of the British Association cribbed this idea from this manual?] Certainly there are as many stars in the heavens as there were when God made them. They are also fixed in the firmament, and will not fall from hence while the world endures."

The atmosphere is described as one of the four elements in which we live, and in which every corporeal body dwells. "There are four elements in which all earthly bodies dwell, which are—*aer, ignis, terra, aqua. Aer* is atmosphere; *ignis,* fire; *terra,* earth; *aqua,* water. Air is a very thin corporeal element. It goes over the whole world, and extends up nearly to the moon. No man or any cattle has any breathing except by means of air. The breath that we blow out is not the soul, but is the air in which we live in this mortal life."

The treatise concludes with a short description of rain, hail, snow, and thunder, which he thus explains:—

"Thunder comes of heat and moisture. The atmosphere draws the moisture to it from below and the heat from above, and when they are gathered together, the heat and moisture within the atmosphere strive with each other with fearful noise, and the fire bursts out and injures the produce of the earth, if it be greater than the moisture. If the moisture be greater than the fire, then it does good. It is loud on account of the extent of the air, and dangerous on account of the shooting of the fire. Be this treatise here ended, God help my hands."

These brief extracts will suffice to show the state of physical science in the tenth century. Almost all his facts are, as we now know, mere assertions, and in many cases wholly devoid of truth; but from an observation made by our author, he appears to have had no mean opinion of his scientific knowledge. He very modestly remarks, that "he knows that it will seem incredible to unlearned men if we speak scientifically concerning the stars and concerning their courses."

The next treatise to which I will call your attention is written in Anglo-Norman by Philip de Thaun, The earliest existing MS. dates about the twelfth century. It is devoted almost entirely to an explanation of the calendar. He commences by stating his reasons for writing the book; among others, in order to enable priests to maintain the law (that is, the time when festivals and fasts ought to be observed); and he thus disposes of those critics who may happen to find fault with the work, or venture to doubt its usefulness:—"But whatever some may say who have got no sense, that I have laboured in vain when I made this book, they will swear, it may be by the virtues of heaven, that I never knew how to rhyme or set out an argument, but I care not what a fool says; I do not repent. There are ill speakers enough when there are few eucomiasts; men who blame, and none who amend. I never invented or laboured at it for fools; know that it is villany, and I hold it folly that a man should judge if he knows not how to plead, or to blame what he cannot amend. So the villain said in reproof to the drunkard: 'The worst wheel cries in the cart.' 'Very hard is the apple which never ripens.'"

You will perceive that the author, like Sancho Panza, has a liking for proverbs, and he introduces them at every opportunity. One or two short extracts will suffice to give you an idea of the scientific value of this treatise:—"It is called a week which is formed of seven days. Originally God invented it by six days that he worked; on the seventh he reposed. This he called a week. And so it is written in the law which we read: six days we ought to work, and rest the seventh, for the love of the Lord, who kept this day. And now we will show why the days are named. The Pagans invented the names which they gave to the days. The first, which we call Sunday, they gave to the sun, and gave his name to it because he enlightened the world and drove away night; and it pleased God that it should be so called, for it was his day, and he chose to have it. The second day they gave and assigned to the moon, for the world which she enlightened when the sun is set. The other days they gave to the gods whom they loved. They worshipped four. One they called Mars; he was a bold and valiant knight; to his honour they assigned the third day (Marsdi); we call it Tuesday, according to their practice." In similar style he treats of the months, the signs of the zodiac, the festivals and fasts of the Church.

The third treatise is by the same author, and is called "The Bestiary, or Book of Beasts," and is probably founded on some Latin treatises. The writings of Philip de Thaun belonged to a period of our history when Anglo-Norman was the common language among respectable classes of society. The author commences with an allusion to the Queen of England. "Philip de Thaun into the French language has translated 'The Bestiary' a book of science for the honour of a jewel, who is a very handsome woman: Alice she is named, a Queen she is crowned, Queen she is of England; may her soul never have trouble! In Hebrew, in truth, Alice means praise of God. I will compose a book; may God be its commencement. What is in Greek *leun*, has in French the name of *king*. The lion in many ways rules over many beasts; therefore is the lion king. Now, you shall hear how. He has a frightful face, the neck great and hairy; he has the breast before square, hardy, and pugnacious; his shape behind is slender, his tail of large fashion, and he has flat legs, and haired down to the feet: he has the feet large and cloven, the claws long and curved. When he is hungry or ill-disposed he devours animals without discrimination, as he does the ass, which resists and brays. Now, hear, without doubt, the signification of this."

A naturalist of the present day would probably be satisfied with giving a specific description of the animal he was treating upon; or, if he aimed at writing a popular book, would give some of its habits; but our author does not let his readers off quite so easily. He was evidently no materialist, for he finds a spiritual significance in all the animals he describes. The lion, he says, signifies the Son of Mary. "He is king of all people, without any gainsay. He is powerful by nature over every creature, and fierce in appearance; and with fierce look he will appear to the Jews when he shall judge them, because they made themselves guilty when they hanged him on the cross, and therefore they have merited to have no king over them. The square breast shows strength of the Deity. The shape which he has behind, of very slender make, shows humanity, which he had with the Deity. By the tail is indicated justice, which is placed over us. By the leg, which is flat, he shows that God was constrained, and it was convenable that he should give himself up for us. By the foot, which is cloven, is demonstrance of God, who will clasp the world, and will hold it in his fist. By the claws is meant vengeance upon the Jews. By the ass we understand the Jews very rightly; the ass is foolish by nature, as the Scriptures say; he will turn from his way, if one does not drag him entirely to it. Just such a nature the Jews have, who are fools; they will never believe in God unless they do it by force; they will never be converted unless God have mercy upon them."

(I suspect the Society for the Propagation of Christianity among the Jews have not understood this important fact, and consequently they are not so successful as our author would have been if such a society had existed in his day, and he had been a member of it.)

Our naturalist proceeds to describe an animal which, by some unaccountable oversight, is not mentioned by Buffon, Cuvier, or Owen. He says: "Monoceros is a beast which has one horn on his head; therefore it is so named. It has the form of a goat. It is caught by means of a virgin. When a man intends to take and ensnare it, he goes to a forest where is its repair. There he places a virgin with her breasts uncovered, and by its smell the Monoceros perceives it. Then it comes to the virgin and kisses her breast, falls asleep on her lap, and so comes to its death. The man arrives immediately and kills it in its sleep, or takes it alive and does as he likes with it. It signifies much. I will not need to tell you Monoceros is Greek: it means one horn. A beast of such description signifies

Jesus Christ; one God he is and shall be, and was and will continue so. He placed himself in the virgin, and took flesh for man's sake; and for virginity to show chastity; to a virgin he appeared, and a virgin conceived him; a virgin she is, and will be, and remain always."

Fig. 1. Seal of Margaret, Queen of Scotland, on a letter to her brother, Henry the Eighth, dated April 11, 1513. (Cottonian Library.)

I will not try your patience any further with the signification of the various animals our author describes. I would, however, call your attention to one or two forms not known to modern naturalists.

"Thus saith Solomon of the ant rightly, and of the idle man who waits for fine weather: 'Be not slothful; look at the ant.'

"This say writings—that the ant has three natures. It has such a nature when it issues from its hole orderly in the morning right on its way, and when it has found grain of all sorts of corn it knows well which is wheat by the smell alone; it does not care for grain of barley, but if it is a grain of wheat it takes it in with its mouth, carries it to its nest, and is supported in the winter.

"Also, Isidore speaks of another ant. In Ethiopia there is a river, there the grain of gold is produced in it, which they collect with their feet, and defend it from the people. People dare not approach them to take or touch it. Whom the ants bite, they die immediately; no one dares approach these; the ants are so fierce if any one will have some of that gold to make his treasure of. By a stratagem they contrive, they have great plenty of the gold. They keep without food mares which have newly colted. Then on the third day, as you will find, a little basket on the backs of the mares: they bind it firmly. They make them pass the river to bring gold, and draw them to a meadow which has plenty of grass. The ants are there where the mares go. They make their cells in the basket, and load the mares. When they are satisfied, charged, and filled, they repair back behind them. They run to the colts, where they are neighing, which the men have attached by the river. Thus, truly, that people get gold. There is also a beast which is master of the ant. It is the formicaleon. It is the lion of ants; whence it is thus named. It is a very little beast. It puts itself in the dust where the ant goes, and does it great outrage. But of this matter I will no more discourse, because I will now begin to treat of another."

Time will not allow of further examples of this singular composition; but a short account of the remainder of the treatise may be of interest. Many of the forms are fabulous. Thus he speaks of an animal called Osida: "It has two feet of a camel and two wings of a bird (perhaps an ostrich). And of a Siren, that is, like a woman to the waist, with the feet of a falcon, and the tail of a fish."

Among the birds described is of course a Phœnix. After treating of birds he says: "Now ends this discourse, and we will speak of stones." The following is a specimen of his mineralogical knowledge.

"There are twelve stones in this world which have great signification, which I will not omit briefly to tell you.

"*Red Jasper* shows love, open, weakness, sweetness.

"*Sapphire* shows faith in God.

"*Chalcedony* shows that we shall be neighbours with God.

"*Smaragdus* shows faith which the Christian has in him.

"*Sardonyx* shows chastity and humility.

"*Sardius* shows sorrow which the saints had on earth for God's love.

"*Chrysolite*, the celestial happiness which they had with the terrestrial life."

And so on with the beryl, topaz, chrysoprassus, jacinth, and amethyst. He also speaks of the Unio, or pearl, as a stone, and says that it represents eight good things,—life, youth, holiness, love, repose, joy, peace, light. "Unio will give that without end. May Saint Mary give us these eight gifts of life, and may God give his majesty to her, for whom this book is made; and may all those who will pray for that and say a Paternoster for it, have the merit of Saint John; may they be in the bosom of holy Abraham. Unio is the Father and Son; Unio is the Holy Ghost; Unio is beginning; Unio is end; Unio is Alpha and Omega. Benedicamus Domino.

"I have shown of three kinds of beasts, of birds, and of stones, that of each of these there is a king. which shows that God is king; in person he is trinity, and one only in divinity. May this God be our aid, and the Virgin Saint Mary. May this God give us true sense and life everlasting. Amen."

With these pious ejaculations the learned naturalist concludes his treatise, and although his ignorance may now elicit a smile of pity, what can be said of the knowledge of natural history at the present time, when the *Mark Lane Express* for September 4th has the following paragraph in answer to a correspondent who inquires how he can rid his fields of charlock. They are unable to give him the required information, but propound a theory that botanists will be surprised to hear :—

"We do not think they come from seed, but is (*sic*) the result of some electrical action producing them spontaneously. The charlock is an unwelcome visitor, but its removal in corn crops is often worse than the evil itself. Let both grow together until the time of harvest. The seed has more value than some suppose, and when crushed will be found a good tonic. Nothing is given to us in vain."

One scarcely knows which to admire most, his bold contempt of Lindley Murray or his botanical knowledge. You will also observe that in the commencement of the precious paragraph he does not think they come from seed, and then a few lines further on he says "the crushed seeds are a valuable tonic." If such a lamentable amount of ignorance is displayed by those whose province it is to educate, who is to teach the teachers?

The above extracts are taken from one of the volumes published by the Historical Society of Science. The Anglo-Saxon treatise occupies about twelve, the treatises of Philip de Thaun above a hundred pages of royal octavo.

AN AURORA BY DAYLIGHT.

A SHORT time since, in a contemporary,* a discussion took place on daylight auroræ, a few observers stating that they had seen such a phenomenon, while at least one correspondent tried to prove such a display was an impossibility. Since then I have anxiously watched for an opportunity of judging for myself, and now can state that aurora displays may be apparent in the daylight. The facts observed will be given in detail, the hours mentioned being Dublin time, taken from the watch of the mail guard.

On October 6th, 7th, 8th, and 9th there were slight frosts, the nights being clear and bright, with brilliant displays of stars, and a rather sharp wind from the north. On the morning of the 8th we travelled from Galway to Clifden, our route lying for more than half the way through the hills of Varconnaught. When leaving the town of Galway, at two o'clock A.M., there was a red glow over most of the sky, being rather more intense to the northward, while toward the southward it was imperceptible, this glow appearing and disappearing at intervals of from fifteen to twenty minutes. These intermittent lights continued till four o'clock, when a bright, brilliant crimson band suddenly darted up from the northern horizon through the North Star, extending southward more than halfway across the heavens. This band lasted only for a few moments, however. Subsequently it graduated into space, and was succeeded by a display of needle-shaped rays of red light, that seemed to be falling every way from the zenith, but especially towards the N.W., N., and N.E. This shower of rays, if it may be so called, might be likened to a shower of red rain or blood, the rays drifting away and gradually disappearing in space, similarly to a passing shower, as any one who is accustomed to a mountainous country must often have observed. Subsequently very similar displays, but of greater or less intensity, succeeded one another at intervals of from about five to ten minutes, till seven minutes to five o'clock, when the first streak of daylight was apparent on the eastern horizon. After the dawn of day, and from that to six o'clock, the aurora was still visible. The colour, however, of the rays changed, first to purple, and afterwards, as the daylight grew stronger, to a neutral tint; but the play of the rays was similar to those of a red colour, except that the intervals of time between each appearance became longer and longer. Furthermore, the rays, instead of brightening up the sky, as they did during the night, now cast a shadow over it. When the daylight had become strong, and all the stars but a few of the larger ones had disappeared, all defined colour seemed to have departed from the aurora rays, they then being more like a fleeting, dusky, thin cloud, or a distant passing shower of rain. Nevertheless, that such appearances were due to the aurora was evident, as they radiated from the northern horizon, besides coming and going similarly to the previously described red lights.

At six o'clock the day had well dawned; scarcely a star could be detected, while the distant mountains, hills, fields, cattle, and houses, were distinctly visible, and the aurora seemed to have disappeared for good. Not so, however, for at seventeen minutes past six there was a grand display; eight double pencils of bright but pale yellow light suddenly appearing, radiating from the edge of a dark cloud that floated due north close to the horizon, having an appearance similar to the rays from a setting sun. These lasted for about three minutes, and disappeared as suddenly as they had come up. The daylight at this time apparently was quite perfect; however, it was not till eleven minutes afterwards (twenty-eight minutes past six) that the edge of the rising sun appeared above the eastern horizon.

From the above facts it seems apparent that an aurora display during daylight may occur, but that such a phenomenon is easily overlooked, as the

* *Nature.*

Fig. 2. Daylight Aurora.

rays that appear as lights in the night-time are less intense than sunlight; consequently, during daylight they generally will appear as *dark* instead of *bright* streaks, and may easily be mistaken for a distant shower or light fleecy cloud. Of the latter I am now quite positive, as very frequently on a bright frosty morning I have been surprised to see what then was supposed by me to be a distant shower, but now is known to have been a morning aurora. G. H. Kinahan.

THE STORY OF A GRAVEL-PIT.

By J. E. Taylor, F.G.S., etc.

I AM the last of my race. My brother story-tellers have had their day, and ceased to be. Had you questioned me a few years ago, I should have been like Canning's Knife-grinder, and had nothing to tell. Even now my story is not complete. New editions are constantly coming out, although their general truth remains unaltered.

Who among my listeners has not played, when a child, in a sand- or gravel-pit? You have them in abundance, scattered over the surface of the country. But there are gravel-pits and gravel-pits—a difference without a popular distinction.

Those I particularly represent are always situated on the banks of some river-valley. Hence their other geological names of "Valley-gravels" and "River-gravels." Frequently they form terraces flanking the present course of the rivers, and you may identify two of these terraces,—a low-lying one and a higher. If you could strip off these banks of gravel, you would find the bare rock beneath, or else some thick sheet of boulder clay, which had been scooped out to make the present river-valley. Banked up against these old denuded surfaces are the gravels, whose excavations are so well known as pits. I am one of them, and I propose to tell you my story, as well as I can recollect it. Although I can hardly define the difference between the gravels to which I belong and those which belong to the Glacial series, generally the Middle Drift, yet the practised eye readily learns to detect that there is a difference. The pebbles composing our beds are well rounded, showing they have undergone a tremendous deal of wear-and-tear. They are composed of different kinds of rock, just as you would expect when you know they have been washed out of the boulder clays, or brought down by the river in its passage over the outcrops of successive beds. The flint pebbles have generally an *oily* look about them, and all the pebbles are red and ochreous. Their position along the river-valley, however, is always the best test. Some of these valley-gravels are very thick, whilst others extend as mere banks of local distribution. All of them, however, indicate some degree of antiquity, inasmuch as you will find ancient trees growing on the most recent of these terraces, and, here and there, old ruins which stand upon them. In fact, the gravel-pits indicate a gradual rise in the land for them to occupy their present heights above the river-level. The gravels were originally brought down by the ancestor of the present river, when it was broader and perhaps more turbulent, at the close of the Glacial epoch, when the climature was more severe than it now is, and the quantity of rain and snow which annually fell much greater, so that the river-valley was subjected to great floods, which brought down the materials of which we are composed.

As the land gradually rose, and the climate became more genial, and toned down to its present mildness, the waters of the river shrank in volume, until only the present channel was occupied. But the heights to which we river-gravels rise above the water not only indicate how old we are, but, in some cases, go back as far as the commencement of the original scooping-out of the valley itself.

All this would be very interesting in itself, as geological action connecting the most recent of the great physical changes with those we see in operation around us. But the interest of these valley-gravels is still more enhanced when my listeners understand that it is in them that the *first evidences of Man's appearance on the earth* are met with! All my brother story-tellers have had their say, and many of them have described the commonest of the animals and plants of their day; but not one of them mentioned that mankind was living at the time. It was reserved for so humble and commonplace an object as a Gravel-pit to unfold the most important of all geological discoveries. Men have speculated as to their original ancestors living as far back as the Miocene period, but they have adduced no facts in support. On the contrary, I yield nothing but facts, and those in great abundance. In the gravel-pits you meet with the chipped flint implements, of which you have doubtless already heard. They are imbedded, as stones, along with the other material, having been brought down by the ancient river in the same way as pebbles.

But they are undoubtedly of *human* workmanship. This cannot be gainsaid. You see this at once by the flints having been carefully, and in many cases *artistically*, chipped down to a cutting edge all round. They are generally spearhead-shaped, and about six to nine inches long. Had they not been connected with the question of the antiquity of Man, you would never have heard a word said about their not being of human manufacture. As it is, in order to steer clear of this disagreeable truth, many have invented all kinds of ingenious hypotheses to account for the flints getting chipped in this regular fashion. But it requires far more faith to believe in these theories than it does in the other common-sense inference.

The most damaging fact to them is the *identity in pattern* of these cut and chipped flints, wherever they may be met with. Another important incident is this—the chipped flints are only found in the valley-gravels, or in deposits of the same age. If they have been chipped by accident, there is no reason in the world why they should not be found in gravel-pits of much older date.

From the time when primitive Man used these flint weapons for almost every purpose, slaying wild animals with them, cutting down trees and scooping them out for canoes, making holes in the ice with them for fishing purposes—since then you can trace the whole history of offensive and defensive weapons. Antiquaries and geologists call these most ancient of implements *Palæolithic*,—meaning, in Greek, that they are the oldest known; and the age in which they were produced consequently is known by the same name. When Man first appeared, if we are to reason by the remains with which we find these implements associated, the Woolly-haired Elephant, or *Mammoth*, and the Woolly-haired Rhinoceros, were both natives of Great Britain. It is frequently objected that you do not find the *bones* of man associated with these tools; but the reason is not difficult to find.

Remember how few of the bones, &c. of the ancient Romans and Saxons are met with, in proportion to the number of more enduring ornaments, coins, &c. they left behind them. Then consider that the valley-gravels lie in the line of greatest drainage toward the river, and, as they are porous, the surface water percolates through them on its way to the lowest level. Any particle of carbonate of lime, whether in the form of bone or not, which was deposited in these gravels, would thus be dissolved away. Hence it is that, although the huge bones of elephants, &c., were undoubtedly buried up in the same gravels, we find few or no traces of them. The commonest of their remains are *teeth* and *tusks*, whose dentine and ivory structure saved them from the gradual destruction to which the frailer parts of the skeleton were liable.

Fortunately, there were other agencies at work during the same period, which were conservative rather than destructive. In the fissures of limestone rocks, where water is percolating, that water is usually charged with carbonate of lime. Every drop of water that evaporates on the surface of the walls of a chasm or natural hollow leaves its contained particle of lime behind. This process is always going on, until there has been left on the walls a great fold or layer of what is called *stalactite*. The water drips on the floor, and there a portion is evaporated, the lime being left behind.

As you may guess, the process is marvellously slow, but the layer thus formed on the floor is called *stalagmite*. It is not difficult to see that anything lying on such a cavern-floor would be incrusted over, and eventually covered up. This is what I call a *conservative* process. Now at the time the valley-gravels were forming, savage man was glad to avail himself of any shelter, and the natural caves and hollows of the earth were anxiously sought after, as they are now by the lowest tribes of mankind elsewhere. To such places as Kent's Cavern, Brixham Cavern, &c., savages resorted, bringing with them the fruits of the chase. Here you may find the bones of animals which had been split open in order to extract the marrow, as well as the flint knives and implements, of exactly the same kind as those found in a gravel-pit. Over these there has accumulated a layer of *stalagmite* many feet in thickness; thus carrying you back in time as far as does the deposition and origin of the valley-gravels themselves!

You see, therefore, that the two most accessible groups of facts both point to the same great fact of the antiquity of Man. Succeeding the *Palæolithic* age is that provisionally known as the "Rein-deer period," on account of the large number of the remains of that northern animal which have been found in the bone-caves of the south of France. England and the Continent were then subjected to the periodical migrations of Arctic animals, among which were the Rein-deer, Lemming, Glutton, Elk, &c. The flint implements found associated with the remains of these animals in the south of France exhibit a superior skill, indicating that man's nature was to progress, even at that early stage.

Rude attempts at *carving* and *drawing* were also indulged in, as examples in your principal museums will attest. Then succeeded the next stage, known as *Neolithic*, or "Newer Stone age," which is distinguished by the greater variety in shape of the flint implements, and, more particularly, by the fact that they are, for the most part, ground smooth and to a sharp, knife-like cutting edge. These weapons, however, are usually found strewn on the surface, or imbedded only in peat-bogs and the most recent of river-deposits. Whereas the *Palæolithic* types are limited to valley-gravels and the most ancient of bone-caves, the *Neolithic* show, by their universal distribution and superior workmanship, that they belong to an advanced period. All the savage races still using stone weapons are generally islanders, cut off from the great centres, so that they are "outliers" of a system once universal. This later period is that of the "Lake Dwellings," which link on to that known to antiquaries as the "Bronze period." To this succeeds the Iron age, and, if you like, the present, or "Steel" age. The two former are historical, and come within the range, not only of scientific deduction, but also of written history. I have simply mentioned them to show how, from the time when the most ancient and rude of the flint implements were deposited in the river-gravels, there is more or less of an unbroken sequence. Archæology commences where geology leaves off—the past and the present meet on common ground. Standing on this neutral area, you may gaze backward into the illimitable ages which have gone by, and see the gradual ascension in animal life, which began in the dim and distant Laurentian epoch in the animalcule, and has terminated in Man. Looking forward from the same vantage-ground, you may hopefully note the development of society, the growth of civilization, and probability of the unfolding of the social and moral attributes of man as marvellously as the lower animal life has culminated in its existing apex! Throughout, in the buried past, as well as in the yet unfolded future, you never lose sight of the operations of an Almighty Spirit—ever working, never resting!—out of chaos bringing forth order, —out of simple protoplasmic material educing the animal and vegetable kingdoms, in all their multitudinous types and varieties, until a small area like the superficies of this planet has teemed with life sufficient to stock a million existing worlds! One generation has passed away, but, in doing so, has furnished a basis on which the new comer may ascend to a higher physiological platform. Every form, animal and vegetable, has been but the expression of Divine Love, communicating to them the excess of its own joyous life! Every species has been an outwardly crystallized Divine idea. Spirit has clothed itself with matter, until in Man the past and the future have met: the ancient Greek fable has been more than realized, for it has been true spiritual fire from heaven—given, not stolen—which has been instilled into fleshly clay!

My story is now ended, and, with mine, the series, whose purpose has been to give as plain an outline of the biography of our old world as possible. It will have been seen that a story may be properly read off, even from so common and ordinary an object as a Gravel-pit. In geology, more than any other science, he that humbleth himself shall be exalted! All its objects lie at your feet, and are of the lowliest kind. Not a pebble you accidentally kick before you, not a handful of dust blown by the wind into gutters, not a spadeful of soil turned over, but each is fraught with teaching of the utmost value and of the intensest interest. It is by recognizing a *Cause* that you alone can unlock the secret; setting out with the full belief that everything exists by virtue of a right—has resulted, not from accident, but law,—until you arrive at the highest conception of which man is capable,—that the total of these various laws meet and concentrate into one focus, and find their expression in a personal and Almighty God!

"The land bird is bound to its home by powerful bonds, which, for the most part, are invisible to our dull vision; with some species these limits may perhaps embrace an area less than the hundredth part of a mile."—"*Bird Life,*" *by Dr. Brehm.*

"The South, by destroying its trees, has dried up its springs. It has abandoned the mountains to ruin, and its plains to a couple of scourges—the wind and the flood. The North and Central France bid fair ere long to lose their fuel. Before the Revolution, in 1760, France had thirty millions of hectares in forest—to-day she has less than eight millions."—"*Nature,*" *by Madame Michelet.*

THE SMALL EGGAR-MOTH.

It seems advisable to say a few words upon a correspondence which has been going on for some time on the larva and pupa states of *Eriogaster lanestris* (the small Eggar-moth). Several writers complain that they cannot obtain pupæ, and that the larvæ die when full-fed. I think that this must be owing to a want of attention to one or two peculiarities in their habits. One is well known. As soon as they emerge from the egg, they go to work and mutually construct a silken tent round the twig upon which the eggs have been laid. This habitation is added to as the larvæ grow, and into it they retire when not engaged in feeding. A second habit is not so well known,—that of basking in the sunshine upon the outside of this web. Now if, when the larvæ are collected, their nest is not also taken and carefully kept in contact with their food, they will hardly ever do well; neither do they like to be deprived of sunshine.

Some years ago I brought home a large nest of young larvæ, stood the branch in a jar in an unoccupied room, put fresh branches of blackthorn or whitethorn into other water-jars close by, arranging that the bushes should touch each other, and supplied fresh branches every two or three days, as they withered or were stripped. In this way the larvæ fed well and enlarged their nest to an immense extent as they grew, and it was curious to see them when, at a certain hour in the day, the sun shone upon the nest, crowding upon the outside of it, squeezing in between each other like pigs, and lying so close together that a pin could hardly be put between them without touching. I think, however, that they did not get *enough* sun; for although many spun up in reasonable time, others continued feeding till quite late in the summer, and as, on arriving at full size and assuming their handsome skins, they had become erratic, and required to be kept at home with gauze bags, my patience got exhausted, and having a hundred or two of pupæ, I turned the rest out. About this matter of the long duration of the pupa state: it really is nothing new. It was noticed in "Westwood and Humphrey's British Moths" more than thirty years ago, and most likely long before, but I have not books at hand. I did not expect my moths out the next spring; but one specimen appeared, and with proper treatment, I feel sure that many more would have come out. The second spring I thought of the advice of a writer in the *Entomologist's Weekly Intelligencer*, years ago, and brought down my pupæ one mild day in the middle of February, and put them on to the mantelpiece.

They acknowledged the attention at once, and emerged by dozens. The next year I did the same, and some more came out; but since that only a stray specimen or two have appeared, and I have now been breaking open the sound cocoons, and find that great numbers of the moths have perished in the pupa when fully formed and coloured; and this I have no doubt occurred in the first spring, when they had not sufficient warmth to enable them to burst the pupal envelope.

There is another point—the curious double cocoons, from which nothing ever emerges. These are not divided inside, but are formed by two larvæ uniting their efforts, and producing a broad cocoon the size of the *whole material* of two single ones. Thus, two sides being saved, it is larger than the two single ones would be.

Could anybody expect anything to emerge from this? In the first place, a larva, when assuming the pupa state, requires the most perfect liberty from interference or annoyance. How, then, could *either* of two larvæ, wriggling off their skins in the same cocoon, be expected to succeed? The only chance would be by one dying in the larva state. But then the survivor would have too much room,—would have, in fact, no "purchase" anywhere by which to burst open the lid of the cocoon.

Fortunately an example occurred among my lot; and I found, on opening it, that one larva shrivelled up without attempting to cast its skin, that the other changed, and in due time the moth emerged from the pupa skin, but never left the cocoon. I found it crumpled up and dead, of course. To this large cocoon three others were slightly attached: from one the moth emerged, and in the other two they died when ready to emerge from the pupa.

C. G. Barrett.

NEW SPECIES OF ROTATORIA.

By F. Collins, M.D.

Previous to 1867, while residing in the parish of Sandhurst, Berkshire, it was my fortune to meet with several undescribed species of Rotifers. Presuming that some of the readers of Science-Gossip may be interested in that very attractive group of animalcules, I have forwarded for their perusal the following copy of my rough notes, written five years ago, during the time I was employing some of my leisure hours in studying these very beautiful and interesting creatures.

Melicerta socialis.—Tube irregular in shape, built of large yellowish-brown, granular, egg-shaped pellets, which are heaped up into the form of a tube, without any regard to symmetry. The rotatory disc is divided into two lobes, the anterior division being, as is generally the case, much deeper and more marked than the posterior or dorsal division. The eyes are cervical, two in number, and of a pale rose-colour. The maxillary bulb is placed high up in the neck. The two hooks seen in

Melicerta ringens are absent; but there are two tentacles armed with setæ, and attached in the usual manner. The pellet with which the animal builds its tube is formed in a kind of sac, situated

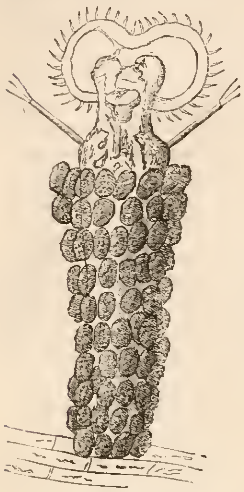


Fig. 3. *Melicerta socialis* (dorsal view).

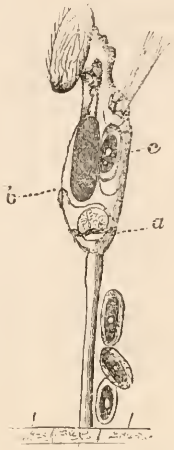


Fig. 4. Ditto, when out of its tube.
a, Pellet. *b*, Cloaca.
c, Egg and ovary.

at the lower extremity of the abdomen, below the intestines and ovary; it is discharged through the cloaca, the creature raising itself, before expelling it, so as to bring the cloaca to a level with the rim of the tube. The egg is deposited in the tube, and remains there until the young is hatched. Length of the adult, about $\frac{1}{60}$ of an inch, Found in shallow ponds, usually attached to moss. Named *Socialis* because groups of four or five are often found attached to the same leaflet.

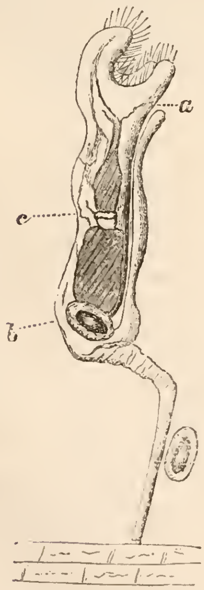


Fig. 5. *Floscularia trilobata.*
a, Cloaca, with long canal leading from (*b*) ovary, &c.
c, Position of the jaws.

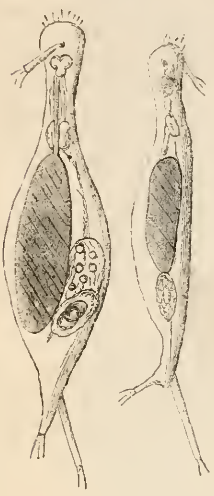
Fig. 6.
a, *Flosculi* just hatched.
b, ditto, thirteen hours after.

Floscularia trilobata.—Tube generally absent; rotatory organ divided into three lobes (whence its name), somewhat similar in appearance to those of *Floscularia campanulata.* The dorsal lobe is frequently much larger than the other two; and when such is the case, it is commonly curved forwards over the funnel-shaped mouth, and presents a somewhat hooded appearance. The setæ are not only much shorter than in other floscules, but they are also differently arranged, being placed between the lobes as well as on their summits, forming a kind of unbroken fringe along the entire margin of the disc; the interlobular setæ are, however, much shorter and finer than those on the summits of the lobes. Two cervical eyes are present only in the young. Vibratile cilia are seen distinctly along the course of the pharynx, as far as the maxillary apparatus, which latter organ, occupying the same position as in other floscules, is armed with three pairs of teeth. The ovary is large. The egg, when expelled, remains attached. The cloaca is situated unusually high in the body, and there is a long canal leading from the intestine and ovary to it. The foot is of great length, and much wrinkled. This is the largest of the floscules; its total length is about the $\frac{1}{40}$ of an inch. It is very rare, being found in only one small pool in the parish of Sandhurst during the years 1864, '65, and '66. It is usually attached to moss.

Fig. 7. *Floscularia edentata.*

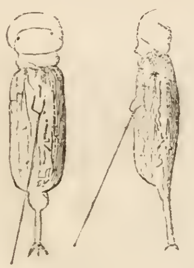
Floscularia edentata.—This is a doubtful species, and perhaps not a true floscule, but more nearly allied to that genus than to any other. It has no tube. The disc or rotatory organ has a few fine setæ attached to it; it is irregular in form, and is not divided into lobes. The creature has no maxillary apparatus, nor has it any teeth. Its food passes directly through the throat into a very capacious stomach, where a variety of the lower forms of life (some of large size) may be seen undergoing the process of digestion. The foot is short, but of variable length; in one specimen a good deal wrinkled. This form of rotifer is very rare; I have seen only two specimens. Each laid an egg while under observation, which remained attached, but were both unfortunately lost before the young ones were hatched. Length of the animal, about the $\frac{1}{80}$ of an inch. Habitat, same as *Floscularia trilobata.*

Notommata caudata.—Eye single, cervical; head somewhat rounded, connected with the body by a long narrow neck. Attached to the head is a (one only) short, singular, flexible, tube-like appendage (tentacle?), surmounted by setæ.* The body, which is somewhat elliptical, is prolonged posteriorly into a kind of tail, on the dorsal surface of which a rounded prominence is observed, and from its summit there proceeds a small setigenous tube,



a b

Fig. 8.
a, Notommata caudata.
b, Lateral view of ditto.



a b

Fig. 9.
a, Stephanops uniseta.
b, Lateral view of ditto.

not unlike, in appearance, the one attached to the head. Beneath this so-called tail, but separated from it by the cloaca, a long narrow foot, with two small pointed toes, joins the body. The maxillary bulb is placed high in the neck, and from it a long œsophagus, with a kidney-shaped gland on each side of it, leads to a large stomach. The ovary is large, and contains from eight to twelve germinal vesicles. When magnified up to 350 diameters, water vascular canals are distinctly seen. Total length, $\frac{1}{120}$ of an inch. Habitat, pools in the parish of Sandhurst.

Stephanops uniseta.—Eyes two, small, frontal; anterior portion of the lorica is expanded into a kind of hood, as in *Stephanops muticus*, but much smaller in proportion to the size of the body. This hood is remarkably clear and crystalline; and the body, although the lorica presents a somewhat tesselated appearance, is so transparent that it is impossible to determine the internal structures. The foot is about half the length of the body; it is furnished with three toes,—one, the dorsal, being scarce half as loug as the others. A long, tremulous bristle—which is fixed into a kind of socket or tube, situated in the centre of the back at about the juncture of the anterior with the middle third of the body—stands out diagonally, and, projecting for some distance beyond the termination of the foot, is kept, by the rapid movements of this restless creature, in a constant state of vibration. Total length, $\frac{1}{150}$ of an inch. Habitat, Sandhurst, Berkshire, in same pools as the above.

* I could never ascertain the exact point to which this appendage is attached.

MOSSES ABOUT LONDON.

I NOTICE that prizes are offered for the best collections of mosses and Hepaticæ to be made in the neighbourhood of London. Candidates for these prizes may be glad to know where to go, and what to look for, in the district with which I am best acquainted.

On Reigate Heath (a swampy wood at its western end should be carefully examined),—

Sphagnum recurvum, rigidum.
,, *subsecundum, cymbifolium.*
Dicranella cerviculata.
Hypnum cordifolium, stramineum.
Brachythecium albicans, rutabulum (var. *robustum*).
Plagiothecium denticulatum.
Jungermannia curvifolia, platyphylla.
Hypnum imponens was found here some time ago.

At the foot of Buckland Hill:—
Thuidium hystricosum.
Hypnum chrysophyllum.

In the Mole, at the foot of Box Hill:—
Rhyncostegium rusciforme.

On trees by the side of the Mole:—
Barbula mucronata.

On trees at the foot of the hill:—
Cryphæa heteromalla.

On the ground, and at foot of trees in the wood:—
Rhyncostegium tenellum, confertum.
Eurynchium pumilum, crassinervium.
Thamnium alopecurum.

Higher up, on the slopes of the hill:—
Cylindrothecium concinnum.
Thuidium abietinum.
Didymodon rubellus.
Leptotrichum flexicaule.
Seligeria pusilla (on chalk).

On trees in the neighbourhood of Box Hill and Dorking:—
Orthotrichum Lyellii, leiocarpum.

In Gomshall Marsh:—
Mnium rostratum.
Webera albicans.
Physcomitrium pyriforme.
Hypnum cuspidatum.

On hedge-banks near Theire :—
Eurynchium Swarzii.
Scleropodium illecebrum.

In the marsh on Keston Common :—
Sphagnum molluscum and others.
Campylopus torfaceus.

In a small pond on Shirley Common :—
Bartramia fontana.
Hypnum aduncum.

I have not explored any other metropolitan district, and should be glad to know, for my own and general information, if any interesting species have been found elsewhere. T. Howse, F.L.S.

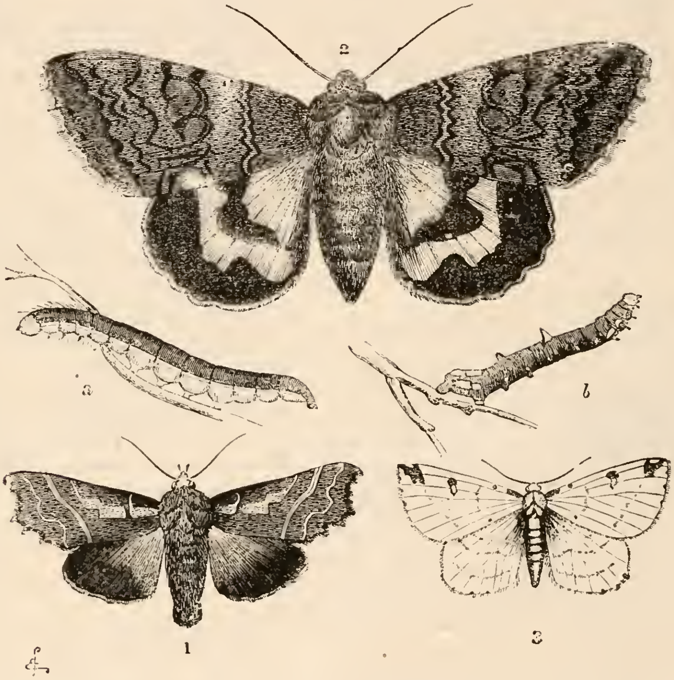


Fig. 10. 1. *Gonepteryx libatrix*. 2. *Catocala nupta*. 3. *Rumia cratægata*: *a*, *Gonepteryx*, larva; *b*, *Rumia cratægata*, larva.

"INSECTS AT HOME"*

FEW writers have done more to popularize Natural History than the Rev. J. G. Wood. He has the art of attracting readers towards a subject they perhaps never cared about before, solely by showing them how earnest he is in its study himself, and what a charm its pursuit can throw over every-day life. We feel that we ourselves are writing for readers in Natural Science, many of whom owe their "conversion" to Mr. Wood. The announcement, therefore, of a new work from his pen cannot fail to interest the reading public, especially as it appears in the height of the "reading season." The additional information that this work is occupied with a subject which is the author's favourite study—Entomology—will raise expectation still higher. "When Greek joins Greek, then comes the tug of war." There is something in cutting the leaves of a handsome volume like that before us, embellished with upwards of seven hundred figures, and occupying nearly seven hundred pages in its decsriptions of insects of every kind, from the beetle to the common house-fly!

There are two ways of criticising a book of this kind,—from a popular scientific aspect, and also from a purely technical point of view. In adopting the former, we unhesitatingly avow our belief that "Insects at Home" will be a godsend to many a young entomologist. The various groups of insects have their anatomy illustrated, part by part, by some familiar type, as the accompanying plates (kindly lent us by the publishers) will best show :—

* "Insects at Home; being a popular Account of British Insects." By the Rev. J. G. Wood, F.L.S., &c. London: Longmans, Green, & Co. 1872.

Fig. 12. Dragon-flies, &c.

1. *Ephemera vulgata*. 2. Ditto, larva. 3. *Libellula depressa*. 3 *a*. Ditto, emerging from pupa-case. 4. *Libellula*, larva. 5. *Calopteryx virgo*. 6. *Agrion minium*. 7. *Phryganea grandis*. 8. Ditto, larva-cases, or "Caddis-worms."

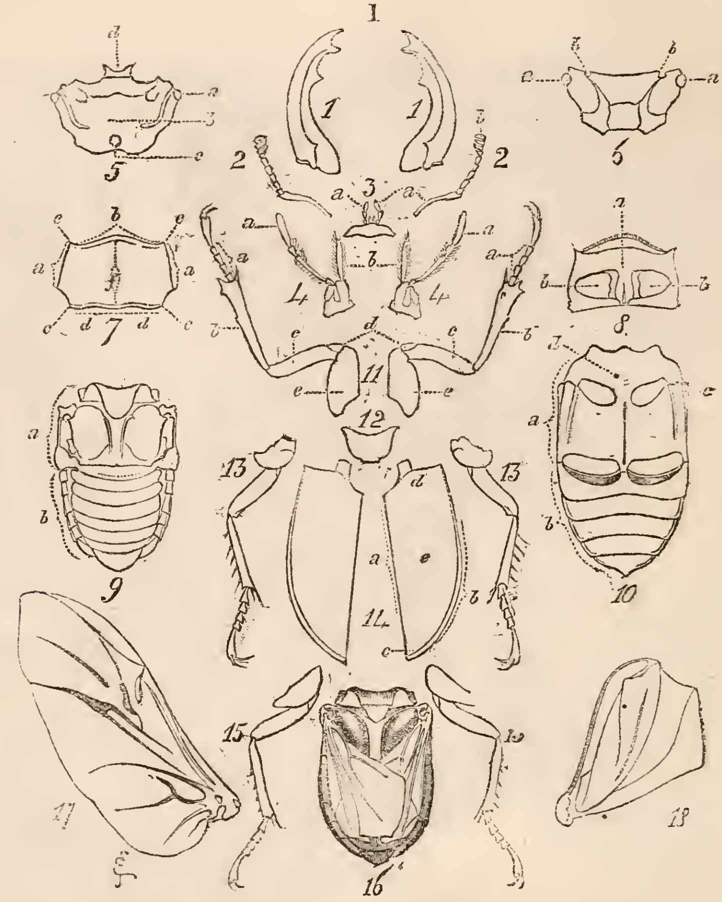


Fig. 11. *Lucanus cervus* (dissection).

Parts of the Head.—1. Mandibles, or jaws. 2. Antennæ. 2 *a*. Scape. 2 *b*. Club. 3. Labium, or lower lip. 3 *a*. Labiæ pa'pi, or lip-feelers. 4. Maxillæ, or lower jaws. 4 *a*. Maxillary palpi, or jaw-feelers. 5. Head, upper surface. 5 *a*. Eyes. 5 *b*. Vertex, or crown. 5 *c*. Occiput, or back of head. 5 *d*. Clypeus, or shield. 6. Head, under surface. 6 *a*. Eyes. 6 *b*. Insertion of antennæ.

Parts of Thorax and Abdomen.—7. Protnotum, or upper surface of thorax. 7 *a*. Lateral margin. 7 *b*. Anterior margin. 7 *c*. Posterior angles. 7 *d*. Posterior margin. 7 *e*. Anterior angles. 8. Prosternum, or under surface of thorax. 8 *a*. Sternum. 8 *b*. Insertion of coxæ. 9. Mesothorax and upper surface of abdomen. 9 *a*. Mesothorax alone. 9 *b*. Abdomen, upper surface alone. 10. Metasternum and Abdomen. 10 *a*. Metasternum alone. 10 *b*. Abdomen, under surface alone. 10 *c*. Parapleura, or side-pieces. 10 *d*. Epistema, or breast-pieces. 12. Scutellum.

Legs.—11. Anterior, or first pair of legs. 11 *a*. Tarsi, or feet. 11 *b*. Tibia, or shank. 11 *c*. Femur, or thigh. 11 *d*. Trochanter. 11 *e*. Coxæ. 13. Intermediate pair of legs. 15. Posterior pair of legs.

The Wings.—14. Elytra. 14 *a*. Suture. 14 *b*. Lateral margin. 14 *c*. Apex. 14 *d*. Base. 14 *e*. Disk. 16. Wings, folded on abdomen. 17. Left wing expanded. 18. Right wing folded.

A careful study of these organs, and an endeavour to dissect specimens for himself in a similar way, will be no unprofitable amusement these winter nights for the young naturalist. The author suggests another means of familiarizing oneself with the commonest insects,—that of *colouring* the woodcuts and plates of the present volume, after the natural tints and shades of the insects themselves. For this purpose both plates and woodcuts have been only faintly shaded; a scheme, however, which has already drawn down the wrath of some critics, who have evidently not read the introduction to the volume, in which this intention is set forth. Of the woodcuts especially we cannot speak too highly, both for their artistic skill and zoological accuracy. The full-page plates are weaker, and of the coloured frontispiece the less said the better.

The whole-page plate is from the work, and is, we think, one of the best of its kind. Mr. Fullager's interesting notes, given elsewhere, on the development of the Dragon-fly from the pupa-case—as witnessed by himself in his own aquarium—will make the details sufficiently clear.

"Insects at Home," as its name implies, treats at great length upon the habits of the various objects it describes. This is done in that pleasant style which marks all Mr. Wood's books, and yet affords us sufficient evidence that the author has been a careful and diligent observer of the habits he describes. We quote the following remarks on the Aphides as an example of the general treatment:—

"The Aphides form the food of very many insects. The larvæ of the Ladybirds feed entirely upon them, and so do those of the Lace-wing flies. They are also eaten by the larvæ of the swift and active Syrphida. Several Hymenoptera provision their nests with them, and others of the parasitic kind, such as the Chalcidicæ, Proctotrupidæ, Cynipidæ, and Ichneumonidæ. As to these last insects, the way in which they operate on the aphis is very remarkable. As may be inferred, from the size of the aphides on which they are parasitic, they are of very small dimensions; and one of these tiny creatures, when standing on the back of an aphis which it is about to wound, looks much like a rook perched on a sheep's back.

"When the fatal egg has been introduced under the skin of the aphis, the wounded insect, like the stricken hart, separates itself from its fellows, and passes to the under side of a leaf, and there fixes itself. Its body soon begins to swell, and at last becomes quite globular and horny, the change being caused by the death of the aphis and the rapid growth of the parasite within it. The Ichneumon passes rapidly through its changes, and in a short time assumes the perfect form, always with its head near the tail of its victim, pushes off the last two or three segments of the dead aphis, and makes its escape into the world. The dead and empty skins of such hapless aphides may be found plentifully towards the end of summer, sticking firmly to the leaf, and showing the round aperture through which the destroying parasite has crept. Sometimes there is a sort of contest between the aphis and the Ichneumon-fly, the former, however, having no more chance against its tiny foe than has a rabbit against a weasel. If the aphis have its beak deeply plunged into the bark, the Ichneumon-fly has an easy task, for the aphis can do nothing but kick and struggle while anchored to the spot by its proboscis, and all the Ichneumon-fly has to do is to make its deadly lunge. But if the aphis be wandering about the plant, the Ichneumon-fly has to walk about with it, and try first one side and then the other, until she can find an opportunity of depositing her egg."

We give the following as a specimen of the general character of the woodcuts.

In the figure of the caterpillar of the Brimstone-moth the reader cannot fail to see an example of what has been well termed *mimicry;* for nothing could better represent the fragment of a twig of white-thorn than the stretched-out condition of the caterpillar. The thorn-like prominences on its back still further assist in the illusion.

In conclusion, we should add that there are some valuable notes in the book to the young dissector and entomologist, and hints respecting nomenclature, arrangement of specimens, &c.

THE DRAGON-FLY.

HAVING in July last procured from a pond in the neighbourhood of Canterbury some pupæ of the Dragon-fly, and carefully watched the full development of the insect in my aquarium, I was so delighted at the beautiful sight, that I have endeavoured to give a description of it to the readers of SCIENCE-GOSSIP. After witnessing the metamorphosis of three of them, I happened to read the account given in SCIENCE-GOSSIP by F. Pollock, of his observations in Nov. 1868 (p. 245), and have witnessed most of the things there described. He remarks "that if the readers of SCIENCE-GOSSIP could be induced to watch, and be fortunate enough to witness the change of the pupa into the perfect Dragon-fly, they would be inclined to admit that few sights in nature are more wonderful."

No one for the first time witnessing the metamorphosis would (without being previously informed) for a moment think that the position of the insect was the natural one. They would most likely come to the conclusion I did, that it must fall and be injured, or killed. Under that impression I placed a sheet of paper beneath its head, to prevent such a mishap; but the moment the paper touched the head, the insect showed, by a peculiar movement, that it was annoyed, and endeavoured to avoid coming into contact with it. I soon found that the seemingly unnatural and helpless position was the proper one.

It is amusing to observe the care the pupæ manifest in getting into a position where nothing can be in the way to obstruct their development. One in particular came up out of the water, and slowly climbed to the top of a reed I had placed in it. To keep it perpendicular, I had inserted a piece of wire about two inches from the top. This wire was in its way, and its lowly retraced its steps until it arrived below it. It then placed itself in the usual position, and commenced lashing the body to and fro, at the same time violently jerking it, evidently to obtain a firm hold with its foot-claws on the reed, preparative to the change about to take place. When properly fixed, it became quite stationary for some time, and then a small opening became perceptible in the middle of the upper part of the thorax, and, gradually enlarging, the head of the fly was drawn slowly out and thrown backward until the head and thorax were clear of the pupa-case. When it had reached this position it remained quiet, with the exception of an alternate stretching and contracting of its legs, as though trying their strength before the next move.

When sufficiently strong to bear the weight of the body, it gently turned itself backwards and laid hold on the head of the pupa-case. As soon as it was firmly fixed on it, the remainder of the abdomen dropped out of the case and hung outside it. Up to this time the wings had not begun to unfold; but as soon as the body was fixed and lengthened, then commenced the unfolding of the wings, presenting a very beautiful sight (especially if viewed through a pocket lens). The body was curved in such a way that the wings should not come in contact with it: at that time they were in so soft a state that to touch anything would injure their delicate tissues.

The creature appeared fully aware of this, as shown by its placing itself exactly in a position where none of the surrounding objects could touch it. The wings unfolded downwards, close together, quite soft, but when sufficiently dry and hardened, they gradually expanded, and showed by a quivering motion that they were ready for flight. Their unfolding perfectly took about twenty-five minutes.

I have had four pupæ come out of one aquarium at different times, but up the same stem of the plant. It is interesting to see each of them place itself in the same position as its predecessors, and go through the movements, as though it had been the same insect performing over again.

My attention was drawn to four white thread-like filaments left attached to the empty and deserted pupa-case, two of which are fixed on the middle of the upper part of the thorax; their length drawn out of the corresponding part of the emerging insect. The other two were fixed one on each side, about a quarter of an inch farther down, below where the wing-cases open from the thorax. On placing them under the microscope, I found them to be tracheæ, and on further examining the empty case the trachea could easily be traced down each side to the breathing apparatus or spiracles at the tail. As the perfect insect will breathe by other spiracles, differently situated, this set of tracheæ is rendered useless and is withdrawn from the insect at its transformation. The opening out of which they are drawn is closed, so that they cannot be detected, as far as my observation went.

I have one pupa living, and shall watch it through the winter, as it is not likely to come out, now it is so late. I fed it at times with flies by placing them on a fine wire and gently moving it before the pupa's head. The latter quickly threw out its curiously-formed mask, seized it, and conveyed it to its mouth.

They are very voracious, and will feed on almost any aquatic insects; as shrimps, beetles, small minnows, &c. I have sometimes given it a quantity of the *Daphnea Pulex*, when a good opportunity was afforded to witness the repeated movements of the mask, in catching and conveying them to its mouth, when its formidable jaws soon dispatch them. The jaws and mask make good subjects for the microscope, with a low power.

Canterbury. JAMES FULLAGER.

MICROSCOPY.

PERHAPS some of your correspondents could inform me whether the "test-scale" Podura can now be anywhere found. Every microscopist is familiar with the common species of *Lepidocyrtus curvicollis*, which supplies scales of the same general character, but by no means either so beautiful or so useful as tests. My own experience would incline me to think that the test-scale insect must be a distinct species, and not a variety of *Lepidocyrtus*. I have collected and examined great numbers of specimens from localities widely distant; but though some of these were passably clear in their markings, yet, when compared with the other in the microscope, the difference was instantly evident. They differ, in fact, as much as either differs, *e.g.*, from *Templetonia*. The professional preparers, I find, can supply nothing except the common kind. I have heard it said, indeed, that the scale in question may be got from a bronze-coloured insect; but this is in direct contradiction to Mr. R. Beck's statement in his work on the microscope, in which he says that his scale is got from an insect of a dark lead-colour, and about $\frac{1}{10}$ of an inch long (p. 145). Mr. M'Intyre is, I presume, better informed on this subject than any one else; yet I have looked in vain among his communications for an explicit statement as to whether he has himself obtained this scale. In one of his papers in the *Monthly Microscopical Journal* he tells us that *Lepidocyrtus curvicollis*, if kept alive, will, as it grows old, develop the "test scale." But this he qualifies by adding the words, "at least I think so,"—a highly important qualification, as it implies that, as a matter of fact, he has not found it to be so himself. Perhaps from his subsequent experience he could now say whether it is so, or whether the species is distinct, and can be found. Considering the number of persons interested in the clothing of these small deer, it certainly seems strange that this information is so difficult to be had. And if the species is distinct, and there was but one colony, it was a curious coincidence that Mr. Beck, who happened particularly to wish for them, should also be the person to find them.—*S. L. B.*

HOW TO OBTAIN DIATOMS IN A STATE OF PURITY.—The *American Journal of Microscopy* recommends as the best plan "of collecting Diatoms in large quantities, to tie a thin fine piece of muslin over the faucet of the hydrant in the evening, and allow a small stream of water to pass through it all night. In the morning take off the muslin and rinse in a little water." The above plan, if tried in this country, would probably supply some of the fresh-water forms, as *Asterionella, Diatoma, Synedra*, &c., in tolerable plenty; but I fear the experimenter would be liable to an action from the water company for waste!

Woody Structure replaced by Pure Silver.—It is suggested that interesting metallic casts, showing the structure of wood, might be made by taking advantage of the deflagration of nitrate of silver on charcoal. When a crystal of nitrate of silver is placed on a piece of burning charcoal, it fuses and sinks into the pores of the wood; and as each atom of charcoal is replaced by one of silver, the structure of the wood is preserved. The *modus operandi* is thus described by Dr. Chandler:—"A crystal of nitrate is placed on a piece of charcoal, and a blowpipe flame directed upon the coal near to the crystal, to start the reaction. When deflagration commences, crystal after crystal may be added; the nitrate fuses and passes down through the porous metal, already reduced, until it reaches the burning coal, where it is reduced." Lumps of silver, weighing an ounce or more, exhibiting the rings of wood in a most beautiful manner, have been thus prepared.

The Animal Nature of the Spongiadæ.—Mr. H. Carter sends the following communication to *Silliman's Journal*, in which he says: "You will be glad to learn that I have confirmed all that Prof. J. Clark, of Boston, has stated about the sponge, and more too, confirmed by an examination of a marine calcareous sponge. I have not only fed the sponge with indigo, and examined all at the same moment, but the sponge so fed was put into spirit directly afterwards, and *now* shows all the cells (monociliated) with the *cilium attached, and the indigo still in the cells.*"

Arborescent Silver.—The very beautiful slides known to most microscopists under the above title are very easily produced, and as every preparation almost invariably shows some striking variation, some of the readers of Science-Gossip may be desirous of knowing the *modus operandi*. A drop of a very weak solution of nitrate of silver is placed on the centre of a slide, a small piece of the finest copper wire is then laid in the middle of the drop; crystallization at once commences, and when it has proceeded as far as the operator desires, the remaining nitrates of silver and copper must be poured off: this requires careful management. The best plan is to breathe on the slide, and then gently tilt it on one side: this causes the fluid to drain away from the crystals. A little distilled water must then be allowed to flow from the opposite side: this will wash away the nitrate of copper, and the slide will dry, and remain so. A small quantity of gum mixed with the distilled water will retain the crystals in their place (about three drops of the ordinary solution of gum in half an ounce of water is sufficient). The slide may now be dried and mounted in an asphalte cell. However, before doing so, it is better to remove the copper wire. This is best done by gently pushing one end of it: this will detach the crystals, and it can then be taken up by the aid of a small pair of forceps.—*F. K.*

GEOLOGY.

At a recent meeting of the New York Lyceum of Natural History, Professor A. M. Edwards showed that the substance called "guano," used in the manufacture of artificial manures, is not, as is usually supposed, the accumulated droppings of birds, but a mud formed by the accumulation of the bodies of animals and plants, for the most part minute, and belonging to the group which Haeckel has collected into a new kingdom under the name of *Protista*. It was deposited along the ocean-floor, and eventually upheaved to the elevations in which its strata are now found. Subsequent changes so altered it that the organic matter was transformed to bitumen. The diatomaceæ, &c., found in guano occur as they would present themselves if deposited in water, and not as they would if they had passed through the stomachs of fish and birds.

In the December number of the *Geological Magazine*, Mr. William Carruthers, F.R.S. (of the British Museum), has figured and described two new species of fossil coniferous fruits from the gault-beds of Folkstone. He states one species to be allied to the existing *Wellingtonia*, and shows that they point to the existence of a coniferous vegetation on the high lands of the Upper Cretaceous period, which had a *facies* similar to that now existing on the mountains on the west of North America, between the thirtieth and fortieth parallels of latitude. No fossil referable to *Sequoia* has hitherto been found in strata older than the Gault, and here, on the first appearance of the genus, we find it is associated with pines of the same group that now flourish by its side in the New World.

Dr. Duncan, F.R.S., has recently shown that a peculiar coral (*Caryophyllia cylindracea*), which has hitherto been regarded as peculiar, in the fossil condition, to the upper chalk strata, still lives in the deep-sea regions of Havannah, and off the Iberian peninsula. It belongs to the group possessing only four cycles of septa in six systems.

A useful addition to our coal supplies has been made by the discovery, at Halesowen, near Birmingham, of a seam of coal fourteen feet thick. This fact controverts the theories hitherto held as to the boundary of the coal-field in this direction, and of the impending exhaustion of the fuel-supply of the "Black Country." The seam lies at the depth of four hundred and twenty yards from the surface.

Fossils of Arctic Circle.—In the report of the Royal Society, printed in the *Times* of December 1st, mention is made of fossils recently brought from Greenland, which prove that the region within the Arctic Circle once enjoyed a tropical climate. Would any fellow-subscriber kindly give particulars?—*E. P. F.*

[The fossils referred to are of Miocene age, and principally plant-remains. Some hundreds of species have been brought to light from the Lignite beds, and their general character indicates that when they grew a warm climature prevailed in Greenland. It is more than probable that, at this time, no ice-cap existed at our North Pole.—Ed. S.-G.]

ZOOLOGY.

Bats.—During the warm summer months it is pleasant to watch these wonderful little creatures seeking their food and sporting in the twilight; but who can tell where they hide themselves during the day, and throughout the winter? Having been much interested in some that came under my notice, I forward the following particulars.

About the beginning of August, in passing through a wood in this neighbourhood, I observed a poor little bat fluttering on the ground, apparently unable to rise. Supposing it to be a young one injured in its fall from a nest, or a more mature one dazzled by the brightness of the sun, I carefully caught it, when, on examination, I found a number of large brown ants fastened on to various parts of its body, sucking the blood from even the wings and eyes. Having been obliged to remove these with some force, I carried the little sufferer home in my umbrella, where he rode very comfortably suspended from the ribs by his hinder claws. He did not long survive his bleeding, being found dead next day.

On the night of the 19th of August my attention was drawn to a noise like a number of mice squeaking in my rainwater-butt, and on looking in I was surprised to find about twenty bats, some drowned in the water, some struggling to get out, and others clinging to the sides of the cask. I took them all out and laid them in the open air to dry themselves and fly away if they could. Next day all the live ones had disappeared, but I found there were some in the shoot or stack-pipe, which is about two inches in diameter, and conveys water from the roof to the cask. I took it down to see if there was any sort of nest in the top of it, but could find none. On shaking it over a large pan, no less than forty of these little creatures fell out, many of them clinging to each other. Some appeared to be older than others, but all able to fly, and eat flies and sugar from the hand. Their bodies were about two inches in length, and their wings about six inches when extended, ears short, and teeth very sharp. There were numerous fleas in the fur, but I did not examine them minutely.—*G. M. M.*

The *Magazine of Natural History* for December has a note of great interest to ornithologists. Messrs. Sharp and Dresser describe two new species of European birds. One of them (*Picus Lilfordi*) is named after Lord Lilford, who shot it in Epirus. It is distinguished from an allied species by its crimson crown and barred rump. The other new species is from the British islands, and has been named *Parus britannicus*, or "Coal Titmouse." It differs from the continental examples by its olive-buff back. These species have hitherto been classed with others.

Insects in Winter.—We might naturally suppose that by the end of winter all those little birds which are solely supported by insect-food would find some difficulty in providing for their wants, having consumed, by their numbers and exertions, nearly all that store of provision which had been provided in the summer and deposited in safety; but I have found the stomachs of the Tree-creeper and the small Titmouse, even in February, quite filled with parts of coleopterous insects, which, by their activity and perseverance, they had been enabled to procure beneath the mosses, on the branches, and from the chinks in the bark of trees, where they had retired in autumn. Such plenty being procurable after the supply of so many months, renders it apparent that there is no actual deficiency of food at any one period of the year. The small slugs and some few insects may be consumed by the severity of winter, but the larger portion of them are so constituted as to derive no injury from the inclemency of the season, but afford during many months provender to other creatures, multitudes yet remaining to continue their race and animate the air when the warm days of spring shall waken them to active life.—*Journal of a Naturalist.*

Work for Naturalists.—The oyster-dredging at present carried on along our coasts affords facilities for investigating our marine zoology at moderate depths, which, I think, might be more fully taken advantage of. Those who have never spent a day with the oystermen have little idea of the almost inexhaustible supply of material which would be highly prized by the microscopist and student in Natural History, that is thrown overboard after every haul of the dredges. The great objection to accompanying "the toilers in the deep" is that their avocation is principally carried on in the winter under severe exposure. I had the good fortune to be out with them on a fine day in October, and found that even then, with a breeze from the north-east, it was cold enough for one accustomed to town-life. I was, however, amply repaid by a great store of marine forms, utterly inaccessible to me by other means. Anxious to have further supplies from time to time, I arranged with one of the boatmen, who readily consented to take charge of my basket of bottles and jars at any time, fill it with anything he might think of interest, and return it to me. Imagine my delight at finding in my first instalment a gorgeous specimen of the Bird's-foot starfish, *Palmipes membranaceus*, Retz. Those who have never seen any but dried specimens of this rare and beautiful echinoderm can form but a slight conception of its bright colouring when alive, as mine was when I received it. A starfish, which I take to be *Ophiocoma Ballii*, Thompson, was among the lot, with *Comatula rosacea*, Link, *Cribella*, and *Solaster* in abundance. I had also a great rarity in the crustaceans, *Inachus leptochirus*, Leach, probably dropped into one of my largest jars by my weather-beaten friend on account of the pearl-like tubercle on its thorax. In "Bell's British Crustacea" this species is said to be extremely rare. I would be glad to know if any Gossip has observed it, as I am inclined to believe, owing to its being liable to become encrusted with sponges, it has been overlooked. Good specimens of *Hyas araneus* and *H. coarctatus*, with other commoner species, were obtained. Two or three species of Nudibranchiata, and a number of conchiferous molluscs, which, with the polyzoa and sponges, made up a formidable list. Should any readers be tempted to try for themselves, I can guarantee ample work for winter evenings.—*W. S., Belfast.*

BOTANY.

Helichrysum (Everlasting).—I grow a large quantity of this useful flower for winter decoration for myself and friends; and as many inquiries have been made as to the best method of treating it when cut, I am able to afford your readers some assistance. Wishing this year not to lose even the unexpanded buds, I gathered a quantity during the first week of this month, some of which were brought into the dining-room until otherwise disposed of. On subsequently removing them, I thought I perceived a partial separation of the petals, and it occurred to me that this effect, if really existing, must be due to the artificial temperature of the room. I immediately tested the matter by placing a number of buds before the fire, and as a result obtained as many full-blown flowers. Knowing, however, the tendency of the Helichrysum to close after it has been in bloom, I was not satisfied with the experiment until I had ascertained that a night's exposure in the coldest room of the house failed to counteract the artificial treatment. Here, then, is a simple method by means of which a large stock of these elegant winter flowers may be utilized—it is now, in most situations, too late in the season to gather buds; but many of your readers may be in possession of some which were gathered green, and are now dry,—all that is necessary being to place them upon the fender before the fire; but in the case of those which are fresh-gathered, it is a better plan to suspend them, bud downward, by a worsted thread kept twirling, for by this arrangement the flower is at liberty to expand equally, and the stalk dries straight and rigid.—*Wm. Tudor Mabley, Altrincham.*

Rare Oxfordshire Plants.—There have recently been complaints in Science-Gossip that compilers of local floras do not take sufficient trouble to ascertain if rare plants, limited to certain localities, can still be found in those localities. A similar statement may, to some extent, be made respecting our standard British Floras. For example, I received in the spring a request from a correspondent to gather *Arabis turrita*, which he said grew plentifully at Oxford. Now in the Floras of Bentham, Babington, and Hooker, this plant is mentioned as growing there, without even a hint that it may be extinct, or that it is more limited there than *Senecio squalidus*, which is very abundant. It was evidently from these standard works that my correspondent had obtained his information. I had visited Oxford several times, but had never seen the plant; hence I determined to make special inquiries. In Walker's "Flora of Oxfordshire" it is stated to have been found on Magdalen College walls, by Sibthorp and the Rev. Mr. White, in 1832; and the author informs us that it formerly grew in the Old Quadrangle. I visited the walls of the college this spring, but found no trace of it. I saw the curator of the Botanic Garden. He showed me a specimen cultivated in the garden; but he informed me that it had not been seen on the college walls for a number of years, having been overgrown by weeds. Last summer I gathered *Salvia pratensis* between Middleton Stoney and Ardley, the locality given in Walker's Flora; and this summer, after visiting several of the localities mentioned in the same Flora for *Stachys germanica*, I gathered it between Sturge's Castle and Enslow Bridge. Can any of your readers inform me if *Thlaspi perfoliatum* can still be found in the neighbourhood of Witney and Barford, as recorded by Walker to have been met with by Sibthorp and Hooker in 1818; or if *Arabis turrita* still grows at Cambridge, in Kent, and at Cleish Castle, Kinross, as stated in the Floras of Bentham and Babington?—*A. French, Banbury.*

NOTES AND QUERIES.

Solar Spots and Spectrum.—As I have not the necessary instruments, I shall be very much obliged if any one who has will observe whether the proportion of chemical to other rays in the solar spectrum differs during the absence and presence of the solar spots.—*E. P. F.*

Initial Letters.—Are your readers aware, Mr. Editor, that letters addressed to any *initials* or *fictitious names* at any *Post-office* will not be delivered to the parties intended, but opened and returned to the writers? It would be well if this regulation were known to those who offer exchanges; and would you request "D. D., Post-office, Bitterne, Southampton," in Science-Gossip of September last, to give some other address?—*R. W.*

The Fox-moth.—Mr. Garfit's description, in the December number of Science-Gossip, of his finding the larvæ of the Fox-moth (*Bombyx rubi*) in such numbers on the east coast of Lincolnshire, reminds me that when staying down in Galway, near Athenry, some four or five years ago, I witnessed a somewhat similar scene. The ground in that neighbourhood is very stony, and covered with heather and stunted furze-bushes. Upon these latter I saw a multitude of caterpillars, of what kind I knew not at the time. However, I have now no doubt, from Mr. Gascoyne's description, that they were those of the Fox-moth.—*J. S. W. Durham.*

Atropos.—Some time ago I had the good fortune to take nine larvæ of this fine moth during a week's visit in the country. I took as much care of them as possible, in hope of rearing at least one or two of them, but they all died in about three or four months after turning to pupæ. Can any of the readers of Science-Gossip inform me how to keep them in a healthy condition during the pupa state?—*E. L.*

Showers of Frogs.—"M. A. B." will be extremely obliged to any one who will freely and fully explain *how* showers of frogs and fish are produced. If they are not absorbed or drawn up into the clouds by the intense heat of the sun's rays, before descending to the earth in showers? An answer in the next number of Science-Gossip will be eagerly looked forward to.

Folk-lore: Mad Stones.—An extract from a New York paper (on page 213 of September number), relating a reputed immunity from the bite of a mad dog, in Pulaski, Tennessee, by the use of what is termed a *mad stone*, is followed by an expressed desire to know if there really exists in America a popular belief that certain stones possess the power of averting hydrophobia from persons bitten by rabid dogs. In reply, I would say that there is such a belief among the credulous, and it is quite wide-spread. It mostly prevails among the unlearned and superstitious, but is not confined to such. A very respectable lady in Richmond, Va., has one of these so-called mad stones, in which she has implicit faith; and I have known a reputable physician in Illinois who fully believed in their efficacy. There are no special localities where these stones are found, nor is there anything very peculiar in their appearance, nor have I ever heard of an authentic fact on which to start or substantiate such an apparently absurd belief.—*Josiah Curtis, M.D., Knoxville, Tennessee.*

Geophilus electricus.—On September 8th, whilst sugaring for noctuæ in a wood, I found a curious centipede crawling on the damp ground; it was about 1½ inch long, pinkish, and had lots of legs; but the feature which attracted my attention was a peculiar phosphorescent light, resembling that of a glowworm (*Lampyris noctiluca*), given out from the whole of its body; it also left a luminous track behind it for several inches. When the bulls-eye was turned on it, the creature "vamoosed," as a Yankee would say; and having a strange apathy to this family of insects, it was allowed to escape. I find, in "Kirby and Spence," page 509, that it is *Geophilus electricus*, but little is said beyond the fact of its habitat usually being under clods of earth, &c. If any subscriber can give me more information concerning this remarkable insect, which is new to myself and friends, I shall be much obliged.—*John Henderson, Reading.*

White Varieties (p. 201, vol. 7, and elsewhere). —It is not uncommon that white varieties occur among flowers and also fruits in the United States. These sometimes become hereditary, so to speak, especially among some of the smaller fruits. During the past summer I have met with white varieties of the blackberry (*Rubus villosus*) in Tennessee, North Carolina, and Georgia; and I have been credibly informed that the same occurs among low blackberries or dewberries (*R. canadensis*). The bushes and vines bearing these white berries quite uniformly, year after year, present every feature and characteristic of the ordinary normal blackberry, and seem identical in all respects, except in producing fruit which ripens without colour. It may be novel to some of your readers, also, that a second flowering not unfrequently occurs upon pear-trees, apple-trees, cherry-trees, &c., in this country. This takes place mostly in the autumn, but this last year I saw an apple-tree with fresh blossoms on it, on the Nautahalah, in western North Carolina, as early as August 21. I have seen apple and pear-trees in fresh bloom, in New England, in October and November; and even now (October 25, 1871) Judge Andrews, of this city (Knoxville, Tennessee), has a common pear-tree in recent bloom. Sometimes, but rarely, we have a fair growth of fruit from second blooming, especially in some of the smaller fruits. I have known strawberries ripen in September and October in the Eastern States; and here we had two very respectable crops of strawberries the past summer,—one at the usual time, early in May, and the second, from the same vines, ripened during the latter days of July and the early part of August. They were daily on sale in our market, as they had been nearly three months previously.—*Dr. Josiah Curtis, Knoxville, Tennessee, U.S.*

Sponge Spicules.—Your correspondent "C." calls attention, in the December number, to the spicules of *Spongilla fluviatilis*, and gives drawings of them. He seems, however, to have made an error, to which I would call attention. The smaller, or birotulate, form of spicule is that of the ovary of *Spongilla fluviatilis;* but the other form, "pointed at each end, and rough on the surface," never occurs in this sponge. It does, however, in *Spongilla lacustris*, being abundant in the dermal and insterstitial membranes; but it would be impossible to obtain both these forms from the same sponge. Each of these species of sponge has a more abundant form of spicule—the skeleton spicule—which in each species is very similar. It is pointed at each end, but perfectly smooth, instead of being rough or spined on the surface.—*H. R.*

INSECTS AND FLOWERS.—With regard to the communication of "W. W. H.," in the December number of SCIENCE-GOSSIP, I quite agree with him that butterflies have a great objection to geraniums, and an equally strong predilection for a lavender hedge; but I think that he is mistaken in supposing that the flavour of the nectar influences the colour of the blossom. In obedience to a general law, butterflies settle on those objects which, by their nature and colour, are most likely to protect them, and shield them from observation. We never see a Meadow Brown soaring aloft like a Red Admiral; it always flutters near the sombre-coloured earth. A place well-known to London entomologists is Box-hill, in Surrey, which during the season literally swarms with graylings. Yet the hill is so covered with flint stones, that the butterflies are quite invisible until disturbed. There is also a little green tortrix (I think its name is *Leptogramma literana*) which is very abundant in the woods here during the summer months; but as it is of a bright green colour, and always settles on the under-sides of the leaves, it eludes the sharpest scrutiny.—*E. C. Lefroy, Blackheath.*

SAFFRON (p. 281, vol. vii.).—The writer of the work referred to by "J. F. C." has probably been misled by a similarity of name in assuming that the bastard saffron, or safflower (*Carthamus tinctorius*), is the plant from which Saffron Walden takes its name. The safflower answers well to the description given. It resembles a thistle, but the seed is smooth, and "without down." The "full-blown flower" is the part used for dyeing purposes, and when dried is said to resemble the true saffron so exactly, as only to be distinguishable by the absence of smell. About the "shrewd pilgrim" I can find nothing; but, according to Paxton's "Botanical Dictionary," this species of *Carthamus* was introduced into England from Egypt in 1551.—*G.H.H.*

SAFFRON: PEEL'S PARSLEY-LEAF (SCIENCE-GOSSIP, 1871, p. 281).—Mr. Thornbury is not so far out as J. F. C. seems to think. The "Orange-juiced Saffron" is, no doubt, *Carthamus tinctorius*, more frequently called Safflower. "Peel's parsley-leaf" refers to the following anecdote from "The Life and Character of Sir Robert Peel," by Sir Laurence Peel, published in 1860:—"Mr. Peel was in his kitchen making some experiments in printing on handkerchiefs and other small pieces, when his only daughter. . . . brought him in from their 'garden of herbs' a sprig of parsley. . . . . She pointed out and praised the beauty of the leaf, and looking, by habit of imitation, naturally to the useful side, she said that she thought it would make a very pretty pattern. He took it out of her hand, looked at it attentively, praised it for its beauty, and her for her taste, and said that he would make a trial of it. . . . A pewter dinner-plate. . . . was taken down from the shelf, and on it was sketched —say, rather, scratched—a figure of the leaf, and from this impressions were taken. It was called in the family Nancy's pattern, after his daughter. It became a favourite: in the trade it was known as the parsley-leaf pattern; and apt alliteration, lending its artful aid, gave its inventor the nickname of Parsley Peel.—*James Britten, British Museum.*

SAFFRON (p. 281, No. 84).—The writer quoted in the above note evidently fell into the error of confounding Safflower (*Carthamus tinctorius*) with Saffron. The Safflower is a composite plant, and is not, I believe, cultivated in England. The following particulars will be seen to agree very well with the description quoted by J. F. C.:—"It has an erect cylindrical stem, branching near the summit, a foot or two high, and furnished with sharp-pointed, oval, sessile, somewhat spiny leaves. . . . On the opening of the flowerets they are rapidly gathered, without being allowed to expand fully. They are then dried with great care. It grows naturally in Egypt, and is cultivated largely in Spain and in many parts of the Levant, whence it is chiefly imported, and from India." (Balfour's "Cyclopædia of India," p. 293.) It is probably to its introduction into Spain that the tradition refers.—*F. V. P.*

INFUSORIA, &c.—Would you be kind enough to let me know which is the best method to prepare and mount "Infusoria"? I should like to know by what means you get rid of the water in which the animalculæ are; and by what preservative you keep the cleaned infusoria?—*H. Sammann.*

[The above inquiry is much too vague to enable us to give the information our correspondent requires. It is necessary to know what organisms he wishes to preserve. The terms infusoria and animalculæ are very indefinite. If he means the desmids and diatoms, full explanations of the best methods of preparing and mounting those forms have appeared from time to time in the pages of this Journal. If, however, our correspondent means such forms as *Rotifers, Stentors, Stephanoceri*, &c., no method has yet been discovered of preserving such delicate and sensitive organisms.]

ANCIENT SERPENT-WORSHIP. — Mr. John S. Phené, F.G.S., has made several interesting discoveries, and has just investigated a curious earthen mound in Glen Feochan, Argyleshire, referred to by him at the late meeting of the British Association in Edinburgh as being in the form of a serpent or saurian. The mound is a most perfect one. The head is a large cairn, and the body of the earthen reptile 300 feet long; and in the centre of the head there were evidences of an altar having been placed there. The shape can only be seen so as to be understood when looked down upon from an elevation, as the outline cannot be understood unless the whole of it can be seen. This mound corresponds almost entirely with one 700 feet long in America, an account of which was lately published, after careful survey, by Mr. Squier. The sinuous windings and articulations of the vertebral spinal arrangement are anatomically perfect in the Argyleshire mound. Beneath the cairn forming the head of the animal was found a megalithic chamber, in which were a quantity of charcoal and burned earth and charred nut-shells, a flint instrument beautifully and minutely serrated at the edge, and burned bones. The back or spine of the animal form was found beneath the peat moss to be formed by a careful adjustment of stones, the formation of which probably prevented the structure being obliterated by time and rain.

ONCE MORE BORRAGO (see p. 239, vol. vii.).—My authority for the Italian *borragine* is *Buttura, Dict. français-ital. et ital.-français* (Paris, 1832), and so it must be written, as the *a* in the second syllable is not long, but short. The Spanish *borraxa* is the old-fashioned mode of spelling of what, since 1815, is written *borraja*: the pronunciation of both was in all times the same (with deep guttural *j*). The Portuguese *borragens* is the plural of *borragem*. Also in other languages there are plant-names used in both numbers; as, for instance, Span. *berro* and *berros* = *water-cresses*. The Dutch *bernagie* is derived from the old verb *bernen* or *barnen*, to-day *branden*, *i.e., to burn*, most certainly with allusion to the rough, somewhat stinging hairs of the plant. So much in defence of what I wrote.—*A. Ernst, Carácas, Venezuela.*

The "Liver."—There appears to be a great diversity of opinion as to the bird now known as the *Liver*, which figures so conspicuously in the arms of Liverpool. Can you tell me what bird is meant?—*Inquirer.*

Tri-petalous Primrose.—On the 11th November I gathered, in a wood near Battle, several blooms of *Primula vulgaris* (common primrose), one of which was a curious variety, with only three petals. It does not seem very unusual for primroses to bloom in the autumn, as in the year 1865 I gathered some on September 26th. I may also mention that on the 19th November I observed three swallows flying in the sunshine at Battle. The temperature in the shade at the time was below freezing.—*J. H. A. Jenner.*

Mice in Traps.—Will any of your readers explain the phenomenon of the death of mice caught uninjured in a live-trap? A house-mouse—after being in the trap a short time, shaking the wires and trying every means of escape—seems to resign itself to its fate and at once die, instead of patiently and without further struggle awaiting the coming of the trapper, as a rabbit does in a snare. It is found in a sitting posture, plump and sleek, but cold and stiff. A field-mouse taken in a similar trap remains alive for a longer time, but dies after some hours in a similar manner. Has the mouse the power of dying of its own will? Or are fright and exhaustion the causes of death? Neither the one nor the other can be nearly so great as it must suffer, often for a lengthened time, from a cat before she destroys it.—*Philomys.*

Walking Ferns, &c.—On a recent visit to a noted watering-place, called Bedford Springs, in Bedford County, Pa., I was very much pleased to find one of the finest specimens of the *Chamtozorus rhizophyllum* (Walking Fern) I ever saw, situated on a rock just above where a strong spring arises. The rock was entirely covered, some of the fronds being a foot in length. Should any of the readers of Science-Gossip wish any leaf fungi, I will gladly supply them, by sending their address to me. I have quite a variety of them. I notice *Rocstelia physota* growing on the leaf of *Pyrus coronaria* (sweet-scented crab-apple), which is, indeed, beautiful. I have also a collection of *diatomaceous* deposits, and desire to send them to you, or such as may desire them. They are mostly from Pennsylvania.—*Dr. J. Curtis, Knoxville, Tennessee.*

A House to Let.—In the aquarium at the Crystal Palace a very diverting entertainment was lately given by the Hermit Crabs. A fight was in progress between a little crab and a big one; but it was a spiritless affair, the big one evidently disdaining so small an opponent, and the small one, naturally taking advantage of such lukewarmness, wanted the big one's shell, and would probably have continued to annoy him had he not caught sight of a comrade who was leisurely examining an empty whelk shell (as a man might look over a house he fancied). Towards this comrade he went, and a smart encounter followed,—a struggle for the possession of the residence. They held one another's claws to gain advantage in the attack, until at last the comrade seemed tired of the contest, and retired, doubtless satisfied with his old house, and not thinking the new one worth fighting about. The little crab having obtained possession of it, turned it quickly over into a convenient position, and rapidly drawing his defenceless posteriors from their confined shelter, inserted them into the new one, and marched off victor.—*H. W. B. G.*

Oak Eggar.—Are the urticating properties of the oak eggar (*B. quercûs*) larvæ commonly known? On taking one of these caterpillars into my hand last autumn I immediately experienced a smarting sensation (resembling the sting of a nettle, only not quite so painful) in the part which came in contact with the creature, and the pain continued for four or five days. I was out of health when I touched the larva, so perhaps that had something to do with the smart occasioned, for another person with me at the time, on taking up the caterpillar, felt no pain whatever.—*E. H. S.*

White Varieties.—It may be interesting to some to know that I have found white varieties of the following plants:—*Ajuga reptans*, two or three specimens; *Betonica officinalis*, a single specimen; *Geranium Robertianum*, a large number of specimens; and *Hyacinthus non-scriptus*, a few specimens. All these grew on a clay soil, with the typical plants. I also found growing on a very chalky soil one large specimen of *Cichorium Intybus*. I think a white variety of this last plant is uncommon.—*T. B. Blow, Welwyn, Herts.*

The British Forget-me-not (*Myosotis*).—The British species of Forget-me-nots—namely, *M. palustris, repens*, and *cæspitosa*—are often confounded with each other. We frequently find, especially in old herbaria, both *M. cæspitosa* and *M. repens* labelled *Myosotis palustris*. All the three species inhabit bogs and the margins of ditches and ponds, and may with propriety be called by the old familiar name Forget-me-not; but this is no reason for assuming that they are all one species; besides, by attending carefully to a few well-defined characteristics, they may at first sight be easily recognized. The two first, named *M. palustris* and *M. repens*, have angular stems, dark-green foliage, a rough habit of growth, and creeping roots; on the contrary, *M. cæspitosa* has a light-green, translucent, and elegant appearance, with tufted fibrous roots, and roundish stem. *Myosotis palustris* (Kiphoff?).—Roots creeping, blackish; stem angular; pubescence of the stem spreading; flowers large, bright blue, with a yellow eye; calyx divided about *one-third* way down; segments broad, triangular, single-ribbed; raceme usually leafless. *M. repens* (Don.) may be known from the preceding species by its *smaller* and paler-coloured flowers, leafy raceme, leaves tapering off to an acute point, and lanceolate acute calyx-segments. *M. cæspitosa* (Schultz), whole plant of a slender, tufted, elegant appearance; roots fibrous, not creeping; stem roundish, clothed with white close-pressed pubescence; calyx divided halfway down; segments lanceolate, 3-ribbed; corolla small, concave, equalling the tube; lobes entire. The flowers of *M. palustris* and *repens* are seldom found except of a bright blue colour, but white varieties of *M. cæspitosa* are not unfrequent. On Delamere Forest I have seen large masses of *M. palustris* and *cæspitosa* intermingled; the latter, however, had only white flowers. Although these species prefer a damp or boggy soil, they may be grown successfully in the garden border.—*James F. Robinson.*

A Strange Reptile.—You may incline to notice a curious creature lately found in a garden in this town. It is a specimen of the Crowned Tapayaxin (*Phrynosoma Blainvillii*), common in America, and often made a pet of in California. It is between a lizard and an iguana, and is, including the tail, about five inches in length. It is covered all over with triangular spines, and has two long horns at the back of the head. The tail, which is not a long one, is bordered on both sides with spines, and the entire animal is plated with armour, like the Armadillo. The feet are very delicate and beautiful, terminated with long, sharp, and elegantly curved claws. When in its native state it can run with considerable rapidity, but in confinement it remains almost stationary, even when touched. It feeds on insects, and is said to be very partial to red ants. How it came into this locality is at present a mystery, and how long it has been there is also unknown.—*Irwin Sharp, Weston-super-Mare.*

Gipsy-moth. — In the September number of Science-Gossip, page 215, Mr. J. R. S. Clifford mentions a Gipsy (*Liparis dispar*) which was taken near Odiham in 1870. He may be interested to know that I have lately seen a fine male of species, taken flying, last summer, in the same locality. It is much darker, and slightly larger than those specimens which we obtain by breeding. It was captured by a Mr. Holland, of Reading, and I have no doubt of its authenticity. This moth is easily reared from the egg, and I was much pleased with the brood I reared during the past season. The *larvæ* are strikingly handsome; but I was not successful in obtaining a female equal in size to the figure in Newman's "British Moths." Have other entomologists remarked this?—*John Henderson.*

[Erratum, under "White Varieties," on p 281, vol. vii. for *Burglifield* read *Burghfield.—J. H.*]

Remedy wanted.—In reply to "A. E. M.," I forward the under-mentioned receipt, which has been found efficacious in removing from the ceiling of a church dark stains which were supposed to have been caused by the admixture of sea sand in the mortar or cement. Wash to be laid on with a common whitewash brush: 4 gallons of clean soft water, 1 pint of oil of vitriol. For colouring after: 1 bushel of Huddleston lime slaked in warm water, 4 lb. of Russia tallow melted in hot water, 1 lb. of green copperas dissolved in warm water, 1 lb. of English umber, all mixed together, reduced to a proper thickness for laying on the work with strong beer-grounds laid on with a brush.—*A. C. T.*

Cleaning Skeletons.—I have had the following receipt given me for cleaning skeletons, and it has answered perfectly to the present time. After skinning and disembowelling the animal, cover it with unslaked lime, adding a little water. Look at it occasionally, and remove the flesh, which will come off easily. This method bleaches the bones, preserves the ligaments, so that the skeleton must always be in its proper position, and does not smell at all. All kinds of animals—birds, lizards, &c.—can be done this way.—*Alfred C. Haddon.*

The Naid Worm.—I have had for some days, in the live-box of my microscope, one of the tribe of annelids. I have frequently examined him with a Ross's 1-inch object-glass. It is the Nais, about half an inch in length, and has hanging about the body (most of them being near to his tail) a goodly number of *Vorticella microstoma*: some budding, some dividing, some sessile, some stalked, but all fringed with cilia; some have become detached whilst the Nais has been swimming in the live-box. It is the only specimen of the Nais I have found so adorned. *Is it often found?* The Naid worm is a beautiful subject for microscopic observation. The specimen I have been examining shows considerable power of elongation and contraction. Its movements in the box have now been incessant for six days. The cephalic portion elongates the most. The bristles, which are seated upon tubercles, are very fine, beautifully transparent. The movements of the animal are very rapid, but he does not seem to use the bristles for progression, but seems to advance like a snake or eel, whilst the tail terminates by a disc like a leech. The elongation of the animal takes place in each segment between the bristles. Whilst at comparative rest (I have never found it still) the encephalic segments are shorter than those which carry the vascular trunk; and when the head is protruded it looks like the snout of a pike. I have not made out the mouth sufficiently to describe it with precision. The parasites upon him do not interfere with his freedom of movement.—*Alfred Carpenter, Croydon.*

Double Lemon.—A friend has sent me a remarkable example of a lemon, which, on being cut across, was found to have a smaller lemon growing inside it. The inclosed fruit was about the size of a nutmeg, completely covered with yellow rind, which had the texture and the aroma of the ordinary external skin. It was a little irregular in shape, showing the marks of union of the carpels of which it is formed, but the sutures are completely united. A section of the inner fruit shows a small quantity of pulp and juice in each carpel, but no attempt at pips. The lemon itself was squeezed before the inner fruit was discovered, so it is impossible to say whether it contained any pips; but it is believed that it did not. The smaller fruit was attached to the base of the larger one without any intervening stalk. The genus *Citrus* is very prone to form supernumerary carpels in its flowers, and these occasionally protrude through the apex of the ripe fruit; but it is unusual to find them completely inclosed. In this case I am inclined to think that the *ovules* have taken the form of carpels rather than that there was a second whorl of pistils in the flower.—*Robert Holland.*

Picris Broomrape.—In Science-Gossip for 1871 (p. 119) there is a paragraph by "J. B., Bradford Abbas," referring to this plant as being "abundant in the hedge-rows and clover-fields of Dorset." There is, I have no doubt, a mistake here as to the name of the plant intended to be referred to. The true Picris Broomrape (*Orbanche Picridis*, F. Schultz) is by no means a common plant, and has only been recorded from Cambridge, Pembroke, Kent, and Isle of Wight. Although from its ascertained range it is very possible the plant may be found in Dorset, it is not likely to be abundant, as represented by "J. B." The plant he refers to is probably *Orbanche minor*, which is very common, in the South of England at least, on clover; it occurs, but much less frequently, on other plants, and I have seen it on a Gazania in a garden. *O. Picridis* is held by many botanists to be merely a variety of this species, from which it differs very slightly. I do not think it has been found on any plant but the *Picris.—F. I. Warner, Winchester.*

NOTICES TO CORRESPONDENTS.

ALL communications relative to advertisements, post-office orders, and orders for the supply of this Journal, should be addressed to the PUBLISHER. All contributions, books, and pamphlets for the EDITOR should be sent to 192, Piccadilly, London, W. To avoid disappointment, contributions should not be received later than the 15th of each month. *No notice whatever can be taken of communications which do not contain the name and address of the writer*, not necessarily for publication, if desired to be withheld. We do not undertake to answer any queries not specially connected with Natural History, in accordance with our acceptance of that term; nor can we answer queries which might be solved by the correspondent by an appeal to any elementary book on the subject. We are always prepared to accept queries of a critical nature, and to publish the replies, provided *some* of our readers, besides the querist, are likely to be interested in them. We do not undertake to return rejected manuscripts unless sufficient stamps are enclosed to cover the return postage. Neither can we promise to refer to or return any manuscript after one month from the date of its receipt. All microscopical drawings intended for publication should have annexed thereto the powers employed, or the extent of enlargement, indicated in diameters (thus: × 320 diameters). Communications intended for publication should be written on one side of the paper only, and all scientific names, and names of places and individuals, should be as legible as possible. Wherever scientific names or technicalities are employed, it is hoped that the common names will accompany them. Lists or tables are inadmissible under any circumstances. Those of the popular names of British plants and animals are retained and registered for publication when sufficiently complete for that purpose, in whatever form may then be decided upon. ADDRESS, No. 192, PICCADILLY, LONDON, W.

L. H. S.—The late nest of Song Thrush is probably a second hatch. It is not uncommon, especially as the autumn was so fine.

E. H. S.—Not an uncommon occurrence, especially after a wet season.

H. F. P.—*Tridontium (Dicranum) pellucidum.—R. B.*

J. S. W. Durham.—The remains of plants embedded in mica-schist are not fossil, but merely roots which had penetrated through the softer portions of the rock and been left there: the same circumstance may frequently be observed in boulder clays.

REV. G. PINDER.—Answer next month.

S. A. BRENNAN.—The list of white varieties of wild flowers has not been received.

T. S.—Green variety of Fluor Spar (Fluate of Lime), probably from Alston Moor, Cumberland, where it is common.

E. A., Clifton.—*Cumpylus linearis.*

B. L. T.—1. *Tapes pullastra.* 2. *Nassa reticulata*, both common British marine shells.

S. WILLIAMS.—The Eyed Hawk-moth (*Smerinthus ocellatus*).

J. A.—Mrs. Keating was the lady to whom stamps were sent. She is very likely travelling about.

R. E. L.—You omitted to inclose the fern whose name was required.

H. J.—No. 1. Tunicate (*Botryllus*). No. 2. A lichen (*Lecidia*).

H. T. M.—The shells are of the commonest kind, and their names might have been found in any elementary work on British conchology. No. 1. *Lymnea stagnalis*; 2. *Planorbis corneus*; 3. *Planorbis marginatus*; 4. *Planorbis vortex*.

E. H. S.—No. 1 is the Wedge-rust fungus (*Melampsora*). No. 2. Oak-spangles.

T. E., Bucks.—A common fossil in the Lias formation (*Gryphea incurva*). Probably from the drift-beds, where it had been re-deposited.

L. D.—See Lyell's "Antiquity of Man," also Lubbock's "History of Civilisation."

J. O., Liverpool.—We shall be happy to assist you as far as possible; but first "try."

R. N.—Probably "White rust" (*Cistopus candidus*); leaf much decayed.

PETRA.—A good recipe for cleaning skeletons will be found elsewhere in our columns.

EDWARD B.—Not a seaweed at all. See SCIENCE-GOSSIP for November last.

R. S. A., Birkenhead.—1. *Hydrobia silvæ.* 2. *Rissoa.* 3. *Kellia.* 4. *Nassa nitida.* 5. Worm-tubes (*Spirorbis*) on back of seaweed.

EXCHANGES.

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

WANTED.—Some or all of the following ferns, established plants,—need not be large. *Adiantum macrophyllum, tenerum* (if true), and *trapeziforme; Asplenium præmorsum, lætum*, and *dimidiatum;* for which a liberal exchange in other varieties will be given. List sent to select from.—Address M. M., Post Office, Faversham, Kent.

SEND stamped and addressed envelope for a leaf of the Evergreen Oak. Any object of microscopic interest acceptable.—E. H. S., Norwood Lodge, Streatham, Surrey.

WANTED dried specimens of Nos. 5, 7, 10, 30, 32, 43, Lond. Cat., for other plants.—Address A. H., Spring Bank, Burnley.

SCALES OF PETROBIUS (land variety) and of *Macrotoma major* (well mounted), for well-mounted microscopic slides.—Rev. W. M. Hutton, Lezaque Vicarage, Ramsey, Isle of Man.

STATOBLASTS of *Alcyonella fungosa* (mounted) in exchange for other good mounted microscopic objects.—John C. Hutcheson, 8, Lansdowne Crescent, Glasgow.

P. CORYDON for other lepidoptera; Bombyces preferred. List to W. J. Lovett, Holly Mount, Croydon.

POLYGALA OXYPTERA, *Pyrola arenaria*, &c., for British Leguminiferæ, Ericaceæ, or Orchidaceæ.—J. H. Lewis, 180, Mill Street, Liverpool.

EXCHANGE.—For Weevils, Wing-case of Diamond-beetle (unmounted).—Edith Meyrick, Downshire Lodge, Blessington, co. Wicklow, Ireland.

DUPLICATES, Galathea, Urticæ, Atalanta, Ocellatus, P. Populi, Caga, Subaccipeda, Menthrasti, Signiperda, Bucephala, Vinula, Quercus (all bred); pupæ of S. Populi for pupæ of Carpini: my wants are numerous.—R. Garfit, Market Square, Alford, Lincolnshire.

CHOICE slides of selected Diatomaceæ in exchange for unmounted and unprepared insects in perfect condition, and properly preserved in spirit or otherwise.—Address Arthur C. Cole, 66, St. Domingo Vale, Everton, Liverpool.

EGGS.—Gyr Falcons', Merlins', and Great and Lesser White Herons', &c., for exchange for other eggs.—Address A. C. A., Post Office, Staines.

BOOKS RECEIVED.

"The Entomologist's Monthly Magazine." December.

"The Zoologist." December, 1871.

"Annals of Natural History," for December.

"Insects at Home"; being a popular account of British insects, their structure, habits, and transformations, by the Rev. J. G. Wood, M.A., &c. with upwards of 700 figures). London: Longman, Green, & Co. 1872.

"Historical Geology," by Ralph Tate, F.G.S., &c. Illustrated. London: Lockwood & Co.

"Quarterly German Magazine." November.

"The American Naturalist." November.

"Bird Life." December.

"The Mountain," by Jules Michelet. London: T. Nelson & Sons.

"Nature, or the Poetry of Earth and Sea," by Madame Michelet. London: T. Nelson & Sons.

"Beautiful Birds in Far-off Lands," by Mary and Elizabeth Kirby. London: T. Nelson & Sons.

COMMUNICATIONS RECEIVED.—T. A.—L. H. S.—H. W. B. G.—W. T. M.—P. W. R.—G. C.—O. S.—G. E. R.—I. S.—E. H. S.—J. H. A. J.—C. E. B.—T. C. B.—G. G.—J. R. S. C.—E. A. M. (accepted).—W. H. L.—T. G. B.—G. H. K.—J. D.—H. H.—T. O. W.—Dr. J. C.—H. H. H.—A. E.—J. F.—S. A. B.—E. P. F.—F. C.—G. J. B.—A. C.—J. S. W.—E. L.—M. A. B.—J. H.—R. H. W.—A. C. T.—S. L. B.—E. H. (accepted).—H. E. W.—J. F. R.—J. B.—E. C. L.—G. H. H.—W. S.—G. G.—J. C.—J. B.—J. G.—J. B. B.—C. M.—T. E. M.—J. T.

COLLECTING AND PRESERVING.

No.. I—GEOLOGICAL SPECIMENS.

THERE is, perhaps, nothing more bewildering to a young student, whose reading has ended in urging him to be a collector, than how he is to go about it. As a rule, as he cannot find exactly what he wants in manuals, and people whom he asks for information are apt to credit him with knowing more than he really does. For the purpose of aiding young beginners as far as possible, it has been determined to commence a series of articles, from month to month, on "Collecting and Preserving" the various kinds of natural-history objects. It is intended that each shall be written by an able and competent naturalist in each department, so that our young readers may have the benefit of the best advice we can give them; and where illustrations of necessary implements, &c., are required, we purpose to furnish them. The great end of natural-history reading should be the development of a love for the objects dwelt upon, and a desire to know more about them. This can only be brought about by such practical acquaintance as collecting and preserving them induces. At the same time we should be sorry to see our young readers degenerate into mere collectors! It is a great mistake to suppose that because you have a full cabinet of butterflies, moths, or beetles, that, therefore, you are a good entomologist; or that you may lay claim to a distinguished position as a geologist, on account of drawers-full of fossils and minerals. But this is a mistake into which young naturalists frequently fall. We have seen people with decided tastes for these studies, never get beyond the mere collecting. In that case they stand on a par with collectors of postage-stamps. Nor is there much gained, even if you become acquainted with English, or even Latin, names of natural-history objects. Many people can catalogue them glibly, and never make a slip, and yet they are practically ignorant of the *real* knowledge which clusters round each object, and its relation to others. Both Latin and English names are useful and even necessary; but when you have simply learnt them, and nothing more, how much wiser are you than before? No, let the learning of names be the alphabet of science—the means by which you can acquire a further knowledge of its mysteries. It would be just as reasonable to set up for a literary man on the strength of accurately knowing the alphabet, as to imagine you are a scientific man the moment you have learned by heart a few scores of Latin names of plants, fossils, or insects! Let each object represent so much knowledge, to which the very mention of its name will immediately conjure up a crowd of associations, relationships, and intimate acquaintances, and you will then see what a store of real knowledge may be represented in a carefully-arranged cabinet.

The heading of the present article will have indicated the subject chosen for brief treatment. We shall never forget the influence left by reading such charming and suggestive books as Mantell's "Medals of Creation," many years ago. Our mind had been prepared for the enthusiasm which this little book produced by the perusal of Page's "Introductory Text-book," Phillips's "Guide to Geology," and several others of a similar character. But we know of none which impels a young student to go into the field and hammer out fossils for himself, like Dr. Mantell's works. It is impossible not to catch the enthusiasm of his nature. The first place we sallied out to, on our maiden geological trip, was a heap of coal-shale, near a pit's mouth, in the neighbourhood of Manchester. Our only weapon was a common house hammer, for we then knew nothing of the technical forms which geological fancy so often assumes. We had passed that same heap of coal-shale hundreds of times, without suspecting it to be anything more than everybody else considered it; viz. a heap of rubbish. Why that particular spot was selected, we cannot now say. We had seen illustrations of carboniferous plants, shells, &c., in books, but we seemed to imagine their discovery could only be effected by scientific men, and that it required a good deal of knowledge before one should attempt to find them. Suffice it to say we made the pilgrimage to the coal-shale heap in pretty much the same mind as we should expect to get the head prize in some fine-art drawing. The humble hammer was put into use, for a brief time without much effect, as we could hardly have commenced on a more barren kind of shale than we had chanced to hit upon. We imagined we could perceive traces of leaves and slender stems, but were afraid to trust our eyes. At any rate, there was nothing definite enough to raise our enthusiasm. But by-and-by, as the hammer kept cleaving open the thin leaf-like layers of shale, there appeared a large portion of that most beautiful of all fossil plants, the *Lepidodendron*. Those who are familiar with this object, with its lozenge-shaped markings running spirally up the stem, will readily understand the outburst of pleasure which escaped our lips! That was the first real fossil—a pleasure quite equivalent to that of landing the first salmon. How carefully was it wrapped in paper, and carried home in the pocket! There never was, and never will be, another fossil in the world as beautiful as that insignificant fragment of *Lepidodendron!*

We have seen a good many converts made to geology in a similar manner, since first we laid open to the light this silent memorial of ages which have passed away. Let a man have ever so slight acquaintance with geology, and give him the chance of hammering out a fossil for himself, and the odds are you thereby make him a geologist for life. There is something almost romantic in the idea that you are looking for the first time, and have yourself disentombed the remains of creatures which probably lived scores of millions of years ago! We would strongly advise our readers, therefore, not to fall into the error of supposing that fossil-hunting belongs to highly-trained geologists. On the contrary, it is by fossil-hunting alone that you can ever hope to be a geologist yourself. Another mistake often made, is that of supposing these rich and interesting geological localities are at a distance. It seems so hard to suppose, after reading about typical sections, &c., that under your very feet, in the fields where you have so often played, there occur geological phenomena of no less interest. But it is actually surprising what evidences of our earth's great antiquity, in the shape of fossils, &c., may be studied and obtained in the most out-of-the-way and insignificant places.

You say you have no *rocks* in your neighbourhood—nothing but barren sands, or beds of brick-earth or clay. Well, go to some section of the latter, exposed, perhaps, in some tarn or stagnant pond in a turnip-field. You examine the sides, and what do you see? Nothing, but here and there a boulder-stone sticking ont. Well, be content with that. You said you had no rocks in your neighbourhood; how, then, has that boulder, which is a rounded fragment of a rock broken off from somewhere,—how has it come there? Here is a poser at once. Examine it, and you will perhaps see that its hard surface is polished or scratched, and then you remember the theory of icebergs, and feel astonished to think that you hold in your hand an undeniable proof of the truth of that theory. Those very scratchings could have been produced in no other way; that foreign fragment of rocks now only to be found on some distant mountain-side, could have been conveyed in no other manner. Not content with the exterior examination, you break the boulder-stone open, when you may chance to find it is a portion of Silurian, Carboniferous, or Oolitic limestone, and that it contains *fossils* belonging to those formations. Here is a find—an object with a double interest turning up where you never expected to discover the slightest geological incident. You examine other boulders, and find in them general evidences of ice-action in their present re-deposition, and most instructive lessons as to the nature of rocks of various formations, from the granite and trap series to the fossiliferous deposits. In fact, there is no place like one of these old boulder-pits for making oneself acquainted with petrology, or the nature of stones.

And now, as to the *tools* necessary to the young geologist. First of all, he cannot take *too few!* It is a great mistake to imagine that a full set of scientific instruments makes a scientific man. The following hammers, intended for different purposes, ought to be procured. Fig. 12 is an exceedingly useful weapon, and one we commonly use, to the exclusion of all others. It is handy for breaking off fragments of rock for examination; and, if fossils be included in them, for trimming the specimens for cabinet purposes. As a rule, however, field geologists are always divided over the merits of their hammers, some preferring one shape and some another. Fig. 13 is generally used for breaking up hard rocks, for which the bevel-shaped head is peculiarly adapted. It is usually much heavier than the rest, and is seldom used except for specific purposes. If our readers are inclined to study sections of boulder clay, and wish to extract the rounded and angular boulder from its stiff matrix, they cannot do better than use a hammer like fig. 14. This is sometimes called the "Platypus" pick. Both ends can be used, and the pick end is also good for working on soft rocks, like chalk. A little practice in the field will teach the student how to use these tools, and when, much better than we can describe on paper. The hammers can be obtained from any scientific instrument manufacturer, or from any of the dealers in geological specimens. We have found that the best hammers for usage, however, were to be made out of an old file, softened and well welded, rolled, and then hammered into a solid mass. If properly tempered, a hammer made in this fashion will last you your life.

Fig. 12. Pocket Trimming-hammer.

Fig. 13. Duck's-head Hammer.

Fig. 14. "Platypus" Pick for clay, &c.

So much for the rougher weapons of geological strife. Next, be sure and provide yourself with *thick-soled* shoes or boots. Geological study will take you into a good many queer places, wet and dry, rough and smooth, and it is absolutely necessary to be prepared for the worst. Patent leather boots and kid gloves are rarely worn by practical geologists. And we have heard it remarked at the British Association meetings, that they could always tell which members belonged to the Geological Section by their *thick-soled* boots. A similar remark applies to clothes. The student need not dress for the quarry as he would for the dining-room. Good, strong, serviceable material ought to be their basis.

Secondly, as to the student's comforts and necessaries. These are generally the last thing an ardent naturalist thinks about. For ourselves, however, we give him ample leave to provide himself with pipe and tobacco, should his tastes lie in that direction. *We* never enjoyed a pipe half so much as when solitarily disinterring organic remains which had slumbered in the heart of the rock for myriads of ages. As to the *beer*, we can vouch that it never tastes anything like so good as during a geological excursion. There is a saying—but, of course, it cannot be anything else but apocryphal—that no map of the Geological Survey can be trusted more than two miles from a public-house! The author of this story doubtless intended to insinuate that the geologists might possibly scamp the ground in their haste to be refreshed!

We have found the leathern bags sold for school-book purposes to be as handy to deposit specimens in, during a journey, as anything else. They have the merit of being cheap, are strong, and easily carried. If not large enough, then get a strong, coarse linen havresack, like that worn by volunteers on a field day. Paper, cotton *wadding* (not wool), wooden pill-boxes, and a few boxes, which may be obtained from any practical naturalist, with *glass tops*, are sufficient "stock-in-trade" for the young geologist. The wadding does not adhere to the specimens as wool does, and the glass-topped boxes are useful, as it is not then necessary to open a box and disinter a delicate fossil from its matrix in order to look at it. Add a good strong pocket lens, such as may be bought for half a crown, and your equipment will be complete. If you intend to study any particular district, get the sheets published by the Geological Survey. These will give you, on a large scale, the minute geology of the neighbourhood, the succession of rocks, faults, outcrops, &c. In fact, you may save yourself a world of trouble by thus preparing yourself a week or so before you make your geological excursion. The pith of these remarks applies with equal force if you purpose, first of all, to examine the neighbourhood in which you live. Don't do so until you have read all that has been written about it, and examined all the available maps and sections. This advice, however, applies more particularly to *geological* examination of strata. If you are bent chiefly on *palæontological* investigation, that is, on the study of *fossils*, perhaps it will be best just to read any published remarks you may have access to, and then boldly take the field for yourself. In addition to a hammer, we would advise the young student to take a good steel narrow-pointed chisel and a putty-knife. The former is very useful for working round, and eventually obtaining, any fossil that may have been weathered into relief. The latter is equally serviceable for clayey rocks or shales.

In arranging the spoils of these excursions for the cabinet, a little care and taste are required. We will suppose you to possess one of those many-drawered cabinets which can now be obtained so cheaply. Begin at the bottom, so that the lowest drawers represent the lowest-seated and oldest rocks, and the uppermost the most recent. If possible, have an *additional* cabinet for *local* geology, and never forget that the first duty of a collector is to have his own district well represented! A compass of a few miles will, in most cases, enable him to get a store of fossils or minerals which cannot well be obtained elsewhere. Supposing he is desirous of having the geological systems well represented, he can always do so by the insertion of such paragraphs as those which appear in our own Exchange columns. It is by well and thoroughly working separate localities in this fashion that the science of geology is best advanced. You hear a good deal about the "missing links," and it is an accepted fact that we, perhaps, do not know a tithe of the organic remains that formerly enjoyed life. Who knows, therefore, but that if you exhaust your district by the assiduous collection of fossils, you may not come across such new forms as may settle many moot points in ancient and modern natural history? The genuine love of geological study is always pretty fairly manifested in a student's cabinet. Science, like charity, begins at home. It impels a man to seek and explain that which is nearest to him, before he attempts the elucidation of what really lies in another man's territory!

It is not necessary that the student should waste time in the field about naming or trying to remember the names of fossils, &c. on the spot. That can be best done at home, and the pleasure of "collecting" can thus be spun to its longest length. Box them, pack them well (or all your labour is lost), and name them at home. Or, supposing you do not possess books which can assist you in nomenclature, carry your fossils or minerals, just as you found them, to the nearest and best local museum, where you will be sure to see the majority of them in their proper places and with their proper names. Copy these, and when you arrange your specimens in the cabinet, either get printed cards with the following headings—

*Genus*________________________
*Species*________________________
*Formation*______________________
*Locality*________________________

(which can always be obtained at a cheap rate from the London dealers), or else set to work and copy them yourself in a good plain hand, so that there is no mistaking what you write. As far as possible, in each drawer or drawers representing a geological formation, arrange your specimens in natural-history order—the lowest organisms first, gradually ascending to the higher. By doing so, you present geological and zoological relationship, so that they can be taken in at a glance. You further make yourself acquainted with the relations of the fossils in a way you never would have done, had you been content to huddle them together in any fashion so that you had them all together. Glass-topped boxes, again, are very useful in the cabinet, especially for delicate or fragile fossils, as people are so ready to take them in their hands when they are shown, little thinking how soon a cherished rarity may be destroyed, never to be replaced. Pasteboard trays, made of stiff green paper, squared by the student according to size, can also be so arranged as that the drawer may be entirely filled, and so the danger of shaking the contents about may be removed. Each tray of fossils ought to have the above-mentioned label fastened down in such a way as that it cannot by accident get changed by removal.

The spring and summer time are fast approaching, and we know of nothing that will so much assist in their rational enjoyment as the adoption of some study in natural science. Botany, entomology, ornithology, geology, are all health-affording, nature-loving pursuits. We have passed some of the very happiest moments of our lives in solitary quarries or on green hill-sides, "the world forgetting, by the world forgot!" There, amid the wreck of former creations, and with the glory of the present one around us, we have yielded to the delicious sense of reverie, such as can only be begotten under such circumstances. The shady side of the quarry has screened us from solar heat, and, whilst the air has been melodious with a thousand voices, we have made personal acquaintance with the numerous objects of GOD's creation, animals and plants. How apt are the thoughts of the poet Crabbe, and how well do they convey the feeling of the young geologist in such places:—

"It is a lonely place, and at the side
Rises a mountain rock in rugged pride;
And in that rock are shapes of shells, and forms
Of creatures in old worlds, and nameless worms—
Whole generations lived and died, ere man,
A worm of other class, to crawl began."

JOHN E. TAYLOR.

"NATIVE magnets from Arabia, China, and Bengal, are commonly of a reddish colour, and are powerfully attractive. Those found in Germany and England have the colour of unwrought iron; those from Macedonia are more black and dull."—*Professor Noad's "Magnetism."*

THE BANDED SUN-FISH.

(*Mesogonistius chætodon*, Gill.)

By Charles C. Abbott, M.D.

SEVERAL times I have gone a-fishing this summer (1871), taking with me something to read, and twice that something has been Science-Gossip. Away from the smoke and din of a manufacturing town, in a quiet nook, guarded on three sides with a grandly wooded bluff, and through which wandered a lovely stream, I spent many a whole day; and here it was, while I rested from collecting specimens of the above-named fish, for my aquarium, that I determined, with your permission, Mr. Editor, to give your readers a short pen-and-pencil sketch of this beautiful fish, which, strange to say, has never yet been figured in any scientific journal, and is considered a doubtful species by Gunther in his Catalogue of Acanthopterygian Fishes.

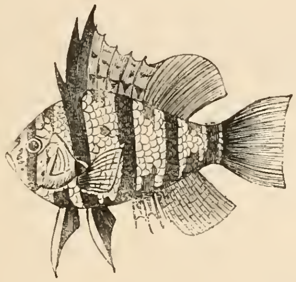


Fig. 15. The Banded Sun-fish.

Well, I am happy to say, there is no doubt whatever concerning either his existence or individuality. To see him caper and show off his eccentricities would delight Mr. Darwin. After ten years' acquaintance with not only this fish but all his associates, I unhesitatingly declare him to be the most intelligent of our small freshwater fishes; and that fish are devoid of intelligence, none will declare who have studied them carefully.

The Banded Sun-fish lives in quiet waters, where there is an abundance of vegetation. He delights to hide in the masses of splatter-docks and allied plants (*Anacharis* and *Nuphar*) that are so characteristic of our quiet streams and mill-ponds; but herein alone he is like the finny companions that he has, as our various cyprinoids and the other sun-fish (*Pomotis* and *Euneacanthus*). If you approach the bank of the stream carefully, and gaze about with patience, you can easily detect him eyeing you very steadily, and if you are not too demonstrative, he will allow himself to be scrutinized. Stand still a moment and see him exhibit! With his dorsal and ventral fins closely pressed upon his back and sides, he moves along, slowly, a very ordinary fish, except that his black and white show out very distinctly; but anon, he sees a shell slowly climbing the stalk of a splatter-dock, and then, oh—wondrous change! Up goes his dorsal fin, and down fall the ventrals! His colours deepen—the black bands are deeper black; the white interspaces assume a pinkish hue; and with fins outspread, down he sweeps upon the unsuspecting shell; and turning, down go his fins again to his body, and he saunters carelessly about, apparently using his colourless pectoral fins only. He is not to be scooped up, in clear water, as any ordinary sun-fish. Give him the advantage of but little vegetation, and he will dodge a scoop-net until your arm aches. Not by fast swimming, for he is a very slow-motioned fish in straight-away locomotion; but he will avoid you by dodging. In this, he is really perfect; and I have got round it, when collecting, by using two nets, after driving him into a mass of dock and other aquatic plants. He dislikes to have his favourite haunt intruded upon by other fish, and makes a great demonstration, when disturbed, which succeeds in driving off some fish, but not all. The ordinary cat-fish especially excites his ire. These slimy, restless cat-fish (*Amiurus De Kayi*) go nosing about in a most impudent way, and bump their clammy snouts against any and everything that attracts their attention. This is too much for our delicate friend, the Banded Sun-fish; and so, when he sees a cat-fish nearing him, he is immediately up in arms. His sharp spiny dorsal fin fairly trembles. He moves not an inch, while the sluggish *Amiurus* comes slowly nearer. All is passive on the Sun-fish's part until the nose of the "cat" is within an inch or more, when, with a rush, half head-over-tail, *scrape* go the sharp spines of the Sun-fish across the "cat's" face, which causes him, as we say in America, to skedaddle. Slowly floating on the clear waters of Crossweelssen Creek, I have peered over the side of my little boat, and watched the above scene, perhaps a hundred times, and ever laughed heartily at the success of my little friend.

The geographical range of this species is not very extended, but being found abundantly about Philadelphia and Baltimore, it has attracted the attention of aquaria-keepers; but their success in keeping them has not been very good. Why, I cannot pretend to say, as they are with the writer a most hardy species; and not only very hardy, but attractive in every way. They become very tame, and will approach the front glass, as you near the aquarium, and if you put your finger or hand in the water, they will glide past it, brushing their side against it, as a kitten rubs itself against one's feet. We know of no fish more suspicious of man when in its native haunts, and none that becomes tame more readily when once placed in a well-organized aquarium. This species was first described by

Spencer F. Baird, of the Smithsonian Institution, in 1854. Since that time it has become, in many streams, steadily more abundant; and although weaker than the common sun-fish, it seems to be driving them off, or at least taking their place. With the mass of hook-and-line fishing-boys, this species is a genuine *rara avis*, as it will not take the hook, however seductively offered. At least such has been my experience; and I have been able at odd times to take some species with a hook that usually bother the "hook-and-liners;" as the "Gizzard-Shad" (*Dorosonia cepedianum*), the "pirate" (*Aphrodederus sayanus*), and some of the smaller "darters" (*Etheostomoidæ*).

Trenton, New Jersey, U.S.

A SIMPLE METHOD FOR PREPARING SKELETON LEAVES.

THE old method for preparing skeleton leaves was to macerate them in water for several weeks until the epidermis and parenchyma were completely decayed; afterwards to rub away betwixt the fingers in clean water all the decayed matter; then to bleach the skeleton by exposing it to the sun's rays. This plan is very tedious—enough almost to tax the patience of Job,—and in most cases it is given up in despair, because not only does it take up much valuable time, but the skeleton is frequently imperfect, for some of the more delicate veinlets having become too soft, are rubbed away with the cellular matter.

From experience, I can honestly recommend what I call the new method to all young botanists, especially so to my fair friends, who take up the science of botany more as an intelligent amusement than for severe study. It has many advantages over the plan detailed above; very little patience is needed; it is cleanly, and the skeleton is ready for mounting or placing in the vase in three or four hours. Of course, in this, as in other things, a little practice is needful to secure perfection.

First dissolve four ounces of common washing soda in a quart of boiling water, then add two ounces of slaked quicklime, and boil for about fifteen minutes. Allow this solution to cool; afterwards pour off all the clear liquor into a clean saucepan. When the solution is at boiling-point, place the leaves carefully in the pan, and boil the whole together for an hour. Boiling water ought to be added occasionally, but sufficient only to replace that lost by evaporation. The epidermis and parenchyma of some leaves will more readily separate than others. A good test is to try the leaves after they have been gently boiling for about an hour, and if the cellular matter does not easily rub off betwixt the finger and thumb beneath cold water, boil them again for a short time. When the fleshy matter is found to be sufficiently softened, rub them separately but very gently beneath cold water until the perfect skeleton is exposed. The skeletons at first are of a dirty-white colour; to make them of a pure white, and therefore more beautiful, all that is necessary is to bleach them in a weak solution of chloride of lime. I have found the best solution is a large teaspoonful of chloride of lime to a quart of water: if a few drops of vinegar are added to the bleaching solution, it is all the better, for then the free chlorine is liberated. Do not allow them to remain too long in the bleaching liquor, or they become too brittle, and cannot afterwards be handled without injury. About fifteen minutes is sufficient to make them white and clean-looking. Dry the specimens in white blotting-paper, beneath a gentle pressure, after they are bleached.

Simple leaves are the best for young beginners to experiment upon: the vine, poplar, beech, and ivy leaves make excellent skeletons. Care must be exercised in the selection of leaves, as well as the period of the year and the state of the atmosphere when the specimens are collected, otherwise failure will be the result. The best months to gather the specimens are July and August. Never collect specimens in damp weather; and none but perfectly-matured leaves ought to be selected.

JAMES F. ROBINSON.

CORMORANTS AT HOME.

ON the 24th of June of the present year (1871) I was introduced to a most interesting assemblage of Cormorants. The way they received me, and the manner of carrying out their domestic arrangements, may be interesting to some of the readers of SCIENCE-GOSSIP.

On the Northumberland coast, a few miles from shore, lies a group of islands called the Farn Islands, thirty-two in number, if the barren rock of half an acre or so may be considered worthy of that name. These islands vary much in size; but it is one of the larger that I have to do with now, and the one on which, in September, 1838, the *Forfarshire* was wrecked, with the rescue of whose crew the name of Grace Darling is so intimately connected. Not a hundred yards from the spot on which this luckless ship struck is the home of the Cormorants. During the time of incubation these birds, together with the lesser Black-backed Gull and a chance Eider Duck and Guillemot, are the sole inhabitants of the island. The herbage is very scanty; but even this is not made available to protect the nests. The barest spots are selected by the Gulls to lay their eggs; and without the slightest attempt to form a nest, two or three eggs are deposited, and it requires the greatest care to avoid treading on them. It is the Cormorants' dwellings, however, that I want to say a few words about.

On the most exposed spot in the island the Cormorants have taken up their abode; and as we approached the island, we saw the long bodies and longer necks of these birds conspicuous; but the perfume the wind wafted to us indicated their whereabouts much stronger than was quite pleasant, for sanitary regulations are by no means carried out satisfactorily by this community. When we had scrambled on the rocks from the boat, we were within fifty yards of the Cormorants' headquarters, inhabited by some fifty or sixty pairs of birds. At this distance they only stretched out their long necks and eyed us with their small green eyes. As we approached nearer they showed uneasiness, and, twisting and stretching their necks, uttered their peculiar call. The only noise I can compare it to is the laughter of our own species. Fancy a party of fifty or sixty elderly gentlemen all laughing, not in a merry, joyous laugh, but in a gruff ha, ha, haw—some rolling it forth in a deep guttural way, some sharper and quicker, and some again in a more lively key, and you will have some idea how the Cormorants saluted us. When we got within five or six yards, the birds stood upright in their nests, stretched out their long necks, gave out their "Ha, ha, haw," and flapped away to a little distance, all the time eyeing us in the most comical way. I saw that the number of eggs varied; some nests only containing two, and others as many as six. I also observed that the eggs, though all of the long, uniform, oval shape by which they are so easily distinguished, varied much in colour, half in the same nest being of a greenish-white, and the remainder of a cream-colour; in fact, I hardly saw a single nest in which the eggs did not thus differ. The parent birds, not content with selecting the most exposed spot, must make their nests more conspicuous by piling up a quantity of black sea-weed, on which they lay their eggs. What purpose this mass of sea-weed served was a puzzle to me. From the heat of the sun in this exposed situation it had become hard and dry, and by no means formed a soft bed for the eggs or young; besides, it was so loosely put together, that it did not prevent the eggs rolling out, and I saw several eggs lying a little distance from the nest. These birds, at other times the most shy and wary of sea-fowl, when at home appear to change their nature, and become as tame as barn-door fowl. During the time we remained near the nests the old birds kept a watchful eye upon our proceedings, though never attempted to drive us from their nests by swooping or flying overhead, as many of the Gulls, and particularly the Terns, did. As soon as we had left the spot a little distance, we saw the old birds resume their post in a quiet, business-like manner, uttering their "Ha, ha, haw" with gravity, and quietly settling down on their nests.

Mount Pleasant, Ferryhill. T. I. B.

THE DESTRUCTION OF ENGLISH BUTTERFLIES.

I HEAD this advisedly, because I believe it is in England, rather than in Scotland or Ireland, that the destruction of these insects is carried on to an extent which greatly diminishes some species, and threatens the extermination of others. I have already referred to this in print, and abler pens than mine have commented on the subject, yet the evil is unabated. My attention has been recently called to it by some observations made by Mr. Birchell in the *Entomologist.* He mentions several northern districts in which certain butterflies, such as Io, Paphia, Rhamni, and Galathea, have become scarce, or have even disappeared. We ask, "How is this—is it due to the builder or the agriculturist?" No; his reply is, that it is caused by the "merciless pursuit and wholesale slaughter carried on by the makers of buttefly pictures. The numbers thus annually destroyed are almost incredible. I have known 250 'peacocks' used in the construction of an elephant, and upwards of 500 'tortoiseshells' in the figure of a crocodile three feet long. A portrait of Lord Brougham in butterflies, the checked trousers depicted by Galatheas' wings, is considered a clever work of art!"

Now this seems laughable, but it is really serious, and the practice, if extensively pursued, will do more mischief than is produced by the extensive captures made by some collectors for the purpose of exchange. No doubt the growth of towns and the cultivation of waste lands have their influences too, but these are not irremediable.

I believe that we shall have at last to institute a society, the object of which shall be the preservation of our butterflies from extensive spoliation. No doubt, in many instances, the common sense of individuals, if it could be appealed to, would lead them to desist from a course as suicidal as that of the man in the fable, the luckless killer of the goose which produced golden eggs. J. R. S. C.

POLYXENES.

POLYXENES, or Polyxen*us*.—"A little oblong animal, with tufts of minute scales on its sides, and a pencil of hairs at its tail. It has twelve pairs of feet, and is found under the bark of trees," so say Latreille, Cuvier, and Lamarck.

This is my Polyxenes—*Polyxenes Lagurus*— or Hare-tailed Millipede. But how came he by so fine a name?

Polyxenes (if it mean anything) means "One who entertains many friends." Let us see who his friends are, and what sort of company he keeps. Strip off a piece of dead bark from the yew-tree, and examine the under side with a magnifying-glass

--a very questionable and sinister-looking party indeed. Wood-lice and small spiders run this way and that, like a gang of pickpockets in Rag-fair disturbed by P'liceman X, on our first approach; but a bolder fellow, of villauous aspect, in a striped uniform, and armed with a pair of tremeudous scorpion claws and with *two* pairs of crocodile jaws beset with long teeth, walks leisurely about backwards, forwards, or sideways, like his cousin the crab, as it best suits him! This is no less a personage than *Chelifer cimicoides;* and it is a matter for congratulation that he is no bigger than he is, for a more formidable-looking monster it is impossible to imagine. Let us put him away for further consideration on some other occasion, and go on with our observations on Polyxenes aud his habitation. Now the latter is anythiug but neat and tidy; and I shrewdly suspect that our friend carries on the

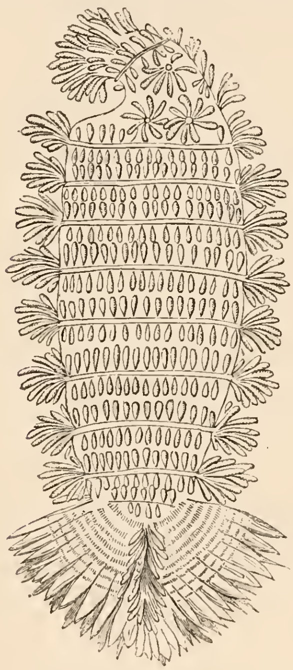


Fig. 16. *Polyxenes Lagurus*, × 33.

business of an old clo' man; for in every direction his own left-off wearing apparel, together with the tattered garmeuts of spiders and earwigs, are seen dangling on the walls by shreds of cobweb, as I suppose, "to be sold a bargaiu!"

Let me recommeud you, my dear young nature-lover and happy possessor of a microscope, to collect some of these old clothes, which, by the way, you will find, as the advertisement has it, "Quite equal to new," as well as living specimens of Polyxenes; for whether examined as opaque or trausparent objects, with spot lens or open diaphragm, with high or low powers, they will give you many au hour of pure enjoymeut; that is, if you are made of the stuff which I hope you are. You will then begin to think, with me, that "Polyxenes, the eutertainer of mauy friends," is not such a very great misnomer after all.

"First catch your hare," says careful Mrs. Glasse. "First catch your Hare-tail," say I; and, haviug caught him, put him in a pill-box lid, and examiue him first with a pocket lens, and then with a two-inch or inch objective. Mark his graceful movements. He runs as if on castors rather than on feet; and, sure enough, if you examine his under surface, you will see that his legs, although he has from twelve to eighteen pairs of them, are very tiny and feeble-looking supports indeed. On close inspection, they will be seen to be four-jointed, and armed with a single claw. He is altogether a harmless and defenceless-looking little animal, and no match for that ruffian "*Chelifer*," whom we detected loitering about the premises, and whom we have remanded, without bail, for future examination.

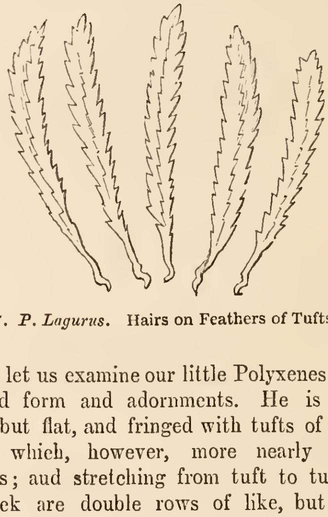


Fig. 17. *P. Lagurus.* Hairs on Feathers of Tufts, × 230.

Now let us examine our little Polyxenes as to his outward form and adornments. He is oval in figure, but flat, and fringed with tufts of so-called scales, which, however, more nearly resemble feathers; aud stretching from tuft to tuft across his back are double rows of like, but shorter, feathers. Here let me remark, that the numbers of tufts and rows vary according to the age of the individual examined; for he does not—as a true insect does—change from worm to grub, and from grub to his mature form, but simply "shuffles off his mortal coil,"—skin, hairs, and leggings all complete, now and then, and takes unto himself a new row aud an additional pair of tufts and legs with each new habit, until he has attained his full complement. He then leaves his shuffled-off "mortal coil" hanging upon a fragment of dirty cobweb, as before described. Now let us look at his tail. Not much like a hare's tail, but a collection of beautiful silvery hairs, quite different from the feathers of the tufts, as we shall see hereafter.

This tail I have caught him expandiug like a fan, and I have a mounted specimen of the slough so displaying it; but in general he carries it as a flat, broad pencil. When spread, the fan is made up of small bundles of the peculiar tail-hairs, with a long feather or two in their intervals.

Let us examine these hairs under a power of about two hundred diameters. They are nearly one-fourth the length of the whole body (which whole length, by the way, may be called a line or a line and a half), and are prettily ornamented with small and nearly opposite branches placed in pairs along their stems, and lying close to them, to the number of twelve or fourteen. But the crown, or top of the hair, is its principal beauty. It is gracefully bent over, like the head of a bell-flower, and forms three, or sometimes four, pendants, slightly clubbed at their extremities, the one nearest to the stem extending lowest down it, and the outermost finishing in a spur directed upwards. When the tail is expanded, these pretty heads are somehow

Fig. 18. *P. Lagurus.* Hairs of Tail, × 200.

locked together in groups, so as to form conical apices to the bundles which I have before described, while the tiny branches of the stems give to the whole a beautiful dotted appearance, well seen with reflected light. A small group of the "feathers" proceeds from the extremity of the body, gracefully dividing the fan into two parts. We will now examine the feathers of the tufts. They are continued, as I have said, across the back in double rows, and their quill ends, if I may so describe them, are hooked, apparently to afford leverage for their elevation or depression; for I have sometimes seen the little creatures walking about with the front of each pair of rows elevated, and the hind one flat upon the back; and when at the same time the tail was expanded, the effect was very pretty, and I have almost thought that "as proud as Polyxenes" might be substituted for "as proud as a peacock," thereby relieving the glorious bird from the monopoly of pride which has been forced upon him. The limb of the feather, which is of a rich brown colour, is club-shaped, being thicker at the extremity than near the quill, and slightly curved. It is four-sided; that is to say, if it were possible to cut one transversely, the section would appear as a cross, and each of the four borders is deeply serrated. A fringe of these feathers surrounds the anterior part of the body and head, but in these positions they are not arranged in tufts.

There is much more to be said about our little myriapod,—of his several simple eyes,* his stout seven-jointed feelers, of his mouth, his gizzard lined with teeth, and of his skin, so beautifully marked and pitted for the attachment of the tail-hairs; but my aim is rather to whet the appetite of some young microscopist than to satisfy it. There is plenty more for him to examine before the interest of our subject is exhausted; and having well entertained himself with this "entertainer of many friends," I would say to him, in the words of the *other* Polyxenes, *i.e.* Shakespeare's:

> "I beseech you,
> If you know aught which does behove my knowledge
> Thereof to be informed, imprison it not
> In ignorant concealment."

Diss, Norfolk, November, 1871. T. A.

A RIVER-VALLEY AND ITS TRIBUTARIES.

THE excavation of a river-valley, including all its branches and minor feeders, is a problem still to be satisfactorily solved, although the new school of subaërialists would persuade us they understand all about it. They state "that for one valley which happens to run a long the line of a dislocation there are fifty or a hundred which do not;" and an ardent Scotch advocate of the theory even goes so far as to assert "there is no point which the detailed investigations of the geological survey have made clearer than this." I, however, during about twenty years of work in the field, have found that valleys in connection with which *there could not* be a break are, comparatively speaking, rare, while those having their associated dislocations are numerous; and of the rest, few, probably, if their structure was visible, would be unconnected with cracks or dislocations of the underlying rocks.

The rocks at the downthrow side of a fault seem nearly always to be more susceptible of denudation than the rocks at the other side; consequently, as a valley forms, it is inclined to gradually extend away from the original line, which would lead a theorist or hasty observer to suppose no connection between the two to exist.

The favourite example of the subaërialists to prove their theory is a flat shore, from which the tide is retreating, and on which minute river-systems form. This, however, is not a true representation of the earth's surface, as it is more or less wet; but if an observer will visit the strand on a warm day, he will

* These eyes are easily seen in living specimens, but difficult to make out in dead ones.

find that as the sands dry they form systems of cracks exactly similar in appearance to a river-system, having main valleys, with branches and minor ramifications; also, if a shower of rain falls, it is in these cracks that the water will drain off.

By the following simple experiment any one can form systems of river-valleys, lake rock-basins, volcanoes, faults, and the like; and as it is so easily tried, the readers of Science-Gossip may judge for themselves whether the statements of the subaërialists are stable or unstable:—Get some lime-mortar and a good-sized table or board. After the mortar is well mixed, incorporate in it some pieces and fragments of unslaked lime (pieces only partially burnt are best for the experiment); then spread the mixture evenly with a trowel or flat board on the table: as the pieces of lime begin to slake, they will swell and form volcanoes (from which will pop up a minute shower of lime flour), gradual upheavals, and systems of faults. If the mortar is well mixed prior to adding the unslaked lime, and the latter is only partly burned, cracks will form in the plaster as it dries, before the lime begins to slake, and the subsequent upthrows due to the lime swelling will, in connection with them, form the systems of faults. If, however, the lime begins to slake before the plaster is dry and cracked, a few long shallow cuts with a knife will act similarly to the cracks. After the lime has all slaked and the plaster is dry, the board or table may be slightly elevated at one end, and then subjected to a shower of water out of a very fine garden syringe, or it may be put out under a soft rain. After these valleys, due to cracks, are subjected to "rain and rivers," regular river-systems will form, valleys with sloping sides will gradually be developed, while at the junction of two or more cracks there will be minute lakes in typical rock-basins. Moreover, in some valleys there will be long narrow lakes, similar to the loughs so common in mountain glens. Various other phenomena may be studied in this simple experiment, but at present I only wish to draw attention to the connection between systems of cracks and river-valleys. The thicker the coat of plaster the more marked the results; and the experiment may be varied by spreading the plaster in layers, and not in one thick coat.

G. H. Kinahan.

NEW BOOKS.

THERE are few sciences which have made more rapid strides than those of geology, electricity, and magnetism. The latter subjects lie somewhat out of our usual line, but we are nevertheless glad to have the opportunity of recommending to such of our readers as are interested in these important sciences, or who wish to know something about them; a book* which has been before the world for more than twenty years, has done great good during that time, and has now reappeared in an enlarged and revised form, under the able editorship of Professor Noad. This little work impresses us as being exactly the kind of book to put into the hands of a youth interested in magnetic and electrical science. It includes the history of discovery in these departments, more particularly a lucid summary of the researches of Faraday and others. The clear and attractive style in which it is written and edited shows that both author and editor are fully *en rapport* with their readers.

The next work† is more in our line. We have frequently been asked to recommend a good work on elementary geology, and have found a difficulty in doing so. Scientific writers are apt to take too much for granted on the part of their readers, and we think that even Mr. Tate is not altogether free from this common error. But it is, in our opinion, the best of its class, whilst its price will bring it within the reach of the poorest student's slender pocket. This book is partly based on the well-known rudimentary treatise on geology by Major-General Portlock, originally published in Weale's series. The additions, however, and especially the number of illustrations, have made quite a new book of it. We like the author's arrangement, and especially the clear and unbiassed manner with which he has placed before his readers the views of different geologists on moot questions. If anything, the work is *too* full, and the reader is apt to be bewildered by the number of subjects brought before him, and the haste with which the limited space obliges the author to pass over them.

The next works‡ are all pretty much of the same character—that is, they have a kind of scientific basis, which serves for the books pretty much as a text does to a sermon. The latter is frequently taken by the preacher, and there is an end of it. The two first books are marked chiefly by rhapsody. They contain many fine passages, and some suggestive ones. The reader, however, cannot get away from the feeling that everything is being strained to the utmost. The views of Michelet, who is a disciple of the Fourier school, are now pretty well known in England. Regarding the earth as herself an animate being, whose natural phenomena are but the expressions of her varied life, it is not difficult

* "Rudimentary Magnetism." By Sir W. Snow Harris, F.R.S., &c. Revised and enlarged by Dr. H. M. Noad, F.R.S. Lockwood & Co., London.

† "Historical Geology." By Ralph Tate, F.G.S., &c. London: Lockwood & Co. 1871.

‡ "The Mountain," from the French of Michelet. By the Translator of "The Bird."

"Nature; or, the Poetry of Earth and Sea." From the French of Madame Michelet.

"Beautiful Birds in far-off Lands; their Haunts and Homes." By Mary and Elizabeth Kirby. London: T. Nelson & Sons.

to see that many of them must be viewed from an original stand-point. The descriptions of mountain scenery are, apart from the singularity of these views, very graphic, and the illustrations, both in the "Mountain" and "Nature," of the most superb character. The translations by Mr. Adams are clear and readable, considering that he had a difficult task before him. As books to place on a drawing-room table, to be taken up for a few minutes, and admired (not studied), we know few more suitable than those we have just mentioned.

To "Beautiful Birds," a good many of the foregoing remarks equally apply. The style is clearer, and less rhapsodical. In fact, many portions of the book are most attractively written. The illustrations (printed in oil-colours) are of the very finest we have seen. Altogether the work is got up in such a tasteful style that it must take a leading place among gift-books. It is hardly scientific, although its subject is so; but it brackets, so to speak, the purely literary with the technical, and includes, in a happy manner, a good deal of what is known about the most beautiful of foreign birds, interwoven here and there with a little of the apocryphal.

MOSSES ABOUT LONDON.

IN accordance with a rule laid down some time ago, among other restrictions which space enforces, is that of foregoing the temptation to give lists of plants, insects, shells, &c. The extended circulation of SCIENCE-GOSSIP renders this injunction necessary, inasmuch as the plants, &c., catalogued in any one district cannot have any great interest for people at a distance. It was owing to the prizes offered to collectors, that we last month gave the list of mosses in the neighbourhood of London, thinking so far to aid our metropolitan readers. For the same reason we have the pleasure of adding the following from Dr. Capron:—

In addition to the species mentioned in the paper by Mr. T. Howes, the following mosses, not usually met with, may be found in the vicinity of Dorking, Gomshall, and Sheire:—

Hypnum delicatulum; H. exanulatum; H. irriguum; H. loreum; H. Megapolitanum; H. polymorphum; H. stramineum; Leptodon Smithii; Neckera crispa; N. pumila; Orthotrichum anomalum; O. Bruchii; O. pulchellum; O. stramineum; O. tenellum; Pterogonium gracile; Schistostega pennata; Seligeria calcarea; Splachnum ampullaceum (Leith Hill); *Tortula vinealis; T. Hornschuchiana; T. cuneifolia; T. marginata; T. latifolia; Trichostomum crispulum; Tetraphis pellucida; Leptobryum pyriforme.*

Many of these are necessarily only found in small quantity, and must be looked for at their proper season, and I only give them to show that much may be done within so short a distance from London.

Sheire. E. CAPRON, M.D.

THE GLASS-ROPE SPONGE.

Hyalonema mirabilis (Gray).

BY F. KITTON.

"We now proceed to speak of the nature of animals, not willingly omitting any part, however mean it may appear; for though many things among them have no charms for the bodily sensês, yet, notwithstanding, even there creative nature has unspeakable delights in store for those philosophic minds which can investigate and distinguish the cause of their formation. . . . . We must enter on the investigation of each individual without any feeling of disgust, inasmuch as in every one some beautiful provision of nature exists."—*Aristotle.*

THE common notion of a sponge is generally derived from the substance used for domestic purposes. The sponge of which I am about to give a brief description would, therefore, never be recognized by the popular mind as related to the sponge of commerce, nevertheless such is undoubtedly the fact. The simple sarcodous substance, which in one case weaves a soft leather-like reticulated structure, in the other elaborates a siliceous skeleton composed of spicula of varied size and outline, some like long threads of spun glass a foot or more in length, whilst others do not exceed the thousandth of an inch.

The *Hyalonema*, or "Glass-rope" sponge, was formerly supposed to belong to a class of organisms called Axiferous Zoophytes, or Barked Corals. The "Glass-rope," with its "warty bark," was supposed to have been distinct from the sponge-like mass forming the base in which it appeared to grow. Dr. Gray describes it as having a siliceous axis. "The axis is formed of many twisted fibres, and its lower end, instead of being expanded, is gradually tapering and is *parasitically* imbedded in a fixed sponge."...... "The part above the base is in different specimens covered, to a greater or less extent (and evidently in the perfect state is entirely), with a kind of leathery bark, with large truncated nipple-shaped scattered tubercles, having flat crowns with radiating grooves and a central depression." In general the specimens are withdrawn and cleaned from the spongy base, and the lower axis is cleaned; but I think it is evident that they all are attached to such a sponge in their natural state.

The bark is formed of two distinct layers; the outer having the appearance of an aggregation of grains of sand united together by a small quantity of animal matter; the inner having imbedded in its substance numerous very fine capillary fibres, of precisely similar texture to those which form the axis of the coral, but of much smaller size; and this portion of the bark evidently extends between and invests each of the fibres of the rope-like axis.

Dr. Gray's description is exact so far as the external appearance of the sponge is concerned, but his surmise that the so-called spongy base is a distinct organism, recent observations have proved to be incorrect. This basal portion is an integral portion of the sponge, and, when growing, is uppermost, the

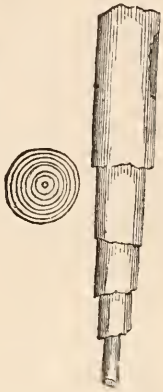


Fig. 20.

Fig. 19. *Hyalonema mirabilis*, ¼ nat. size.

Fig. 21.

long fibres being buried in the ooze, as in the allied forms *Phæronema* (*Holtenia*) *Carpenteri* and *P. Grayi*. (See *Monthly Microscopic Journal*, vol. iii., for a most interesting paper on these and other nearly allied forms, by W. S. Kent, F.Z.S., F.R.M.S.)

The earliest known specimens of this sponge were from Japan, but within the last few years other habitats have been discovered. Professor Perceval Wright found it *in situ* in Setubal, off the coast of Portugal, in 1868, obtaining many fine specimens from that locality, and had the opportunity of examining them whilst alive. He states that the siliceous stem is truly a part of the sponge-mass, and that the "Polythoa" (bark) was simply parasitic upon the stem. Some of the Setubal specimens were very large, the stems of several measuring nearly two feet in length, and the head consisting of a somewhat oval mass, about eight inches in the long and four inches in the short diameter. On opening out the sponge, the interior concave surface was found to be lined with a delicate network of spicules and sarcode; a number of large openings (*oscula*) were also seen, and these were covered with a network of sarcode, the edges of the meshes thickly covered with spicules, called by Dr. Bowerbank "spiculate cruciform spicules" (fig. 28). The professor then goes on to say that he "has seen the parasitic Polythoa in a living state on the siliceous axis of the *Hyalonema*, and that he watched the polyps expand their tentacles, after the fashion of any other zoantharian, to prove that, though they have mouths, these mouths are their own, and not at the service, directly or indirectly, of the *Hyalonema*." Dr. Bowerbank is, however, of opinion that the Polythoa is a portion of the sponge, and not parasitic. The evidences in favour of the latter supposition are (at least so far as I have been able to ascertain), firstly, that the Glass-rope has never been found without the "bark;" secondly, the spicules are siliceous (in all other spicule-bearing species of Polythoa they are calcareous); and that some of them are common to every portion of the sponge; neither am I aware that the Polythoa has ever been found investing any other organism.

The spicules in this sponge are perhaps more beautiful and varied than in any other sponge hitherto discovered. In describing these forms I have adopted the terminology used by Dr. Bowerbank in his work on the British *Spongiadæ*.

Fig. 19 represents the sponge slightly reduced in size.

Fig. 20.—A portion of one of the fibres, anchoring-spicules, of the "Glass-rope," showing its laminated structure, and a transverse section of same, showing mode of growth. The primary fibre is invested with the sarcodous material: this secretes a siliceous casing, which again becomes covered with sarcode, the process being indefinitely repeated; × 400.

Fig. 21.—Bi-clavate, cylindrical, the shaft slightly curved, attenuated below; the obtuse spiculate ends gradually increasing towards the somewhat turgid centre; common in the coriaceous envelope (Polythoa); × 200.

Fig. 22.—Attenuated rectangulated hexradiate spicule, common in all parts of the sponge; × 200.

Fig. 23.—Cylindro-cruciform, shafts smooth, the ends spiculate; × 200.

Fig. 24.—Cylindro-cruciform; shafts densely spiculate.

Fig. 25.—Spined, cylindrical, × 200: 22, 23, 24, and 25 are found in abundance in the coriaceous sheath (Polythoa), less plentifully in the interstices of fibrous axis, and very rare in the body of the sponge.

Fig. 26.—Multi-hamate, bi-rotulate; shaft cylindrical, slight, papillate; × 60.

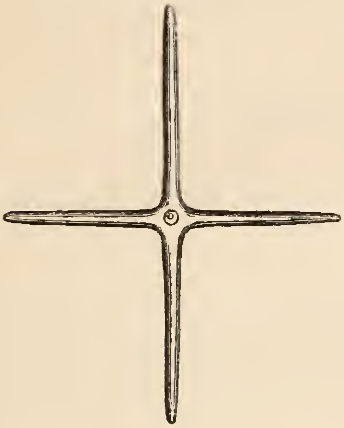


Fig. 22.

Fig. 27.—Side view of ditto, showing stellate arrangement of the hooks.

Fig. 28.—Abnormal form of the above, × 100.

Fig. 29.—Spiculated cruciform spiculum, associated with the above in the body of the sponge, and the interstices of the fibrous axis; × 200.

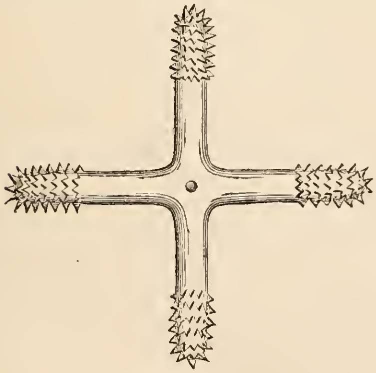


Fig. 23.

Fig. 30.—Simple, bi-hamate, acerate, having each end of the spiculum curved in the form of a hook; × 400; very rare.

Fig. 31.—Quadri-hamate; common in the body of the sponge; × 1,000.

The above do not comprise all the forms of spicula to be found in this remarkable sponge. Professor Thomson has taken a great number of specimens, and his promised memoir on this genus is anxiously looked for.

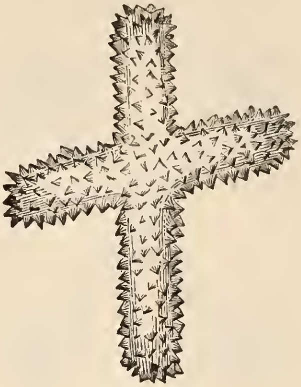


Fig. 24.

Since writing the above, I have had the opportunity of examining a series of specimens belonging to the Rev. J. Crompton, of Norwich. Three of them were of considerable interest, as throwing light

Fig. 25.

Fig. 26.

upon the parasitic nature of the Polythoa. One of the specimens was almost entirely divested of the parasite, but near the top was a small piece of some

Fig. 27.

frondose alga, attached, or rather entangled, round the Glass-rope by several tendril-like filaments.

The surface of the fragment is covered with the Polythoa, identically the same as that found investing the "rope." The other two specimens are still

Fig. 28.

more remarkable: the Polythoa covers the rope, but beneath it may be seen in one specimen a piece of *fine twine*, and in the other a piece of *blue paper* or *cloth*. The twine and paper had evidently been wound round the rope in order to keep the filaments

Fig. 29.

Fig. 30.

Fig. 31.

together, and the Polythoa (apparently attached to some riband-like alga about three-quarters of an inch in width), wound round afterwards. This was probably done by some of the Japanese fishermen who dredged up the specimen.*

"AMONG earth's 'things of loveliness' we recognize two as perfect and peerless: in the Lake of Geneva, the Beautiful—a noble and exalted harmony; in the Lake of Lucerne, the Sublime."—"*The Mountain*," *from the French of Michelet.*

* Specimens of figs. 24 and 26 may be obtained from Mr. Chas. Baker, 244, High Holborn.

THE FOOD OF BEES.

HAVING only recently returned to England, after a residence of some years in France, and wishing to make myself up to the mark in British Natural History, I have borrowed SCIENCE-GOSSIP for 1870, in which I observe there is a controversy as to the food of bees in their separate journeys. Not being a bee-keeper, I cannot contribute any information on this point, but I think it may be interesting to the curious on the subject of the food of bees to learn that in France there are no greater pests to the fruit-garden, especially to the grapes, than the common honey-bees. They are not content with levying a very handsome tithe, but two successive years they devoured four-fifths of my crop, besides attacking all the best of my pears and apples. In short, they are much worse than the wasps, as these are not abundant and troublesome every year as the bees are.

Now, as under the French paternal government bees are not allowed to be kept in towns for fear of their stings, it seemed to me to be hard lines for us townspeople to be obliged to keep bees for the peasants without any safeguard for our fingers from these poaching insects; and therefore, thinking that paternal government did not go quite far enough in this matter, I ventured to propose at one of the meetings of the Linnæan Society of Normandy, at Caen, that we should petition the proper minister for a decree that every bee-master should be obliged to have a flower-garden for his bees, it being the fact that, as a rule, no flowers are grown except in or near towns—not any in the villages—and that the bees, having no food after the seed-clover is cut, flock to the towns to feed upon the grapes and other fruits then ripening.

My proposition, as you may suppose, only created a general smile at my greenness in supposing that a body like the Linnæan Society of Normandy, high as it stands in science, could have the slightest influence with an Imperial minister. While upon the subject of French societies, I may mention that, having lost my crop of potatoes by the cockchafer grub, and knowing that the paternal government had offered rewards for the best mode of preventing their ravages, I proposed, in another society of which I was a member, that a committee should be formed to consider the subject. This was done in the month of November, and a report was made in July of the second year following, when I had again lost my crop each season, the main recommendation of the report being that during the season of the perfect insects they should be caught and thrown into boiling water! Advice very similar in kind to the celebrated method of destroying fleas; only this was in the dry, while the former was in the wet form.*

* It is a fact that many French villagers have never seen boiling water, their only vessel being the soup-kettle; and if you want an *œuf à la coque* it is simmered, not boiled, in the soup.

Another word, to conclude the subject of cockchafers. M. le Marchant, a pharmacien at Caen, has made many experiments on the tenacity of life in the Cockchafer when apparently drowned, and he has found that after complete immersion for a considerable period, till decomposition has begun, if taken out of the water and exposed to light and air, they have still shown signs of life.

T. OGIN WARD, M.D., Oxon.

CLEANING SKELETONS.

HAVING read Mr. A. C. Haddon's receipt for cleaning skeletons in SCIENCE-GOSSIP, p. 23, I write to state why I consider it a method which no true osteologist would ever think of using. Lime ruins bones for scientific purposes. It tones down all the sharp edges, modifies the protuberances, and makes undefined those peculiarities which, though minute, are nevertheless of the utmost importance in comparing one skeleton with another. Though Mr. Haddon is so far right in saying that lime will bleach the bones, I am also convinced that when they are bleached in the sun, they not only remain uninjured, but also gain a far richer and purer colour. I have dug up bones that have lain for some time buried in the ground, when they have been at first of an unsightly brown or even deep black hue; but by exposing them for a time in the air, on a stone terrace facing the south, most of them have been brought to a pitch of almost ivory whiteness. Mr. Haddon also remarks that lime preserves the ligaments. I am not clear how far this is an advantage. For purposes of study, the bones should not be all connected, as it precludes the proper examination of the articulations. I have generally found it preferable to have the skull and all the limbs disconnected from the trunk, and the component bones of the limbs of one side all separated from each other. If it should be desired to preserve the whole skeleton intact, it is almost as easy, with a little care and attention, to do so with great perfection, either by letting the flesh quietly rot off, or by the maceration in water and blood; for the flesh will of course decay before the harder and tough ligaments. Maceration is best if expedition is required, since it will prepare an ordinary-sized specimen in about a fortnight, if most of the flesh is first removed. When time is no object, the process of simple decomposition is the least trouble. A small pit should be excavated, provided with rough shelves, roofed in, with steps leading down to it, and protected from the intrusion of animals. On these shelves the specimens may quietly be left to rot, if they are looked at from time to time. What odour there is, rises but little above the surface of the ground, and is rapidly blown away. In the summer the maggots increase to such an extent, that a specimen is sucked clean with immense rapidity, and at all seasons the work is much assisted by divers predacious insects. I have many bones prepared in this way, in as beautiful a condition as one could wish to see, and with this additional satisfaction, that every groove and every prominence is as clear and sharp as it ever was in the living animal. I am well aware how freely dealers use lime in preparing their bones for sale, and I have often had cause to lament that bones which I have purchased should have had their real beauty taken away and much of their value destroyed, through the ignorance of the person who prepared them. A very weak solution of lime is sometimes necessary to dry those bones in which there is an unusual quantity of oil. This is the only case in which it can be recommended. Supposing all the bones of a small specimen should chance to be entirely separated, as you clean each bone lay it aside in its proper relative position. They then can all be fastened on to a slab of wood, by pins stuck on each side of them and wedging them tight. The vertebræ should be threaded on a fine stick. This method takes care and time, but the result is very satisfactory. Whatever bone chances to be required, can be set free in an instant by the removal of two or three pins, and it can be as readily replaced.

EDWARD FENTONE ELWIN.

Booton, Norwich.

LAW TO PROTECT CURIOUS ANIMALS.

WILL you permit me to say that if in my earnestness to protect some of our useful, curious, or ornamental little creatures from being exterminated, I may have hurt the feelings of any of your correspondents, I much regret it? I like also to set myself right on another point. As these creatures are mostly designated "vermin" by preservers of game, I may be suspected of being unfriendly to protective laws; on the contrary, I believe if the Legislature, yielding to a pressure from those who have no game to preserve, were to lessen that protection, it would be a mistake; I would rather see it extended to those occasionel visitors who every now and then endeavour to re-establish themselves in these islands; viz., Bustards, Sand-Grouse, Hoopoes, Waxen Chatterers, and such-like, which are instantly shot down by so-called naturalists, either for the sale of their stuffed skins or to gratify a morbid ambition.

Many of our creatures are nearly gone,—the Chough, the Badger, the Dabchick, the Hooting or brown Owl. The destructiveness, if any, of this latter creature is much overrated. I have had them perfectly tame, going where they would to seek their food, and returning to my shelter, and I do not recollect seeing anything like feathers in their pellets, but only beetles' wings and other insect remains. Even in the colonies, if the curious and very helpless creatures could be made a sort of royal game, it would be very desirable. It is much to be feared that in very few years' time the Platypus, the Apterix, and other marvels of those lauds, will follow the fate of the Great Auk, the Dodo, the Dinornis, and the Moa. It is a question how far man has a right to exterminate every or any race of God's creatures that may be supposed to lessen the increase of another. GEORGE COX.

BOTANY.

POISONING DRIED PLANTS. — It is commonly recommended to wash specimens for the herbarium with a solution of corrosive sublimate. Is this really necessary? I have never used any poisoning process at all; and though I have many specimens in my herbarium which have been there for thirty years, I have never been troubled with either mould or insects. My plants have not been particularly well cared for: during one period of ten years they were pretty much their own guardiaus. Neither camphor nor any other perfume has protected them; they have accompanied me in half a dozen changes of residence, yet they remain safe and whole, and show no signs of ruin. The only circumstance which I know of in their favour is, that they have been kept in closed boxes—not air-tight, however. Now if my plants have been kept so well under such conditions, without poisoning, where is the necessity for that troublesome and rather dangerous process? Will some of your correspondents tell us their experience in the matter?—*F. T. Mott, Leicester.*

ZOOLOGY.

DEATH'S-HEAD HAWK-MOTH.—Superstition has been particularly active in suggesting causes of alarm from the insect world; and where man should have seen only beauty and wisdom, he has often found terror and dismay. The yellow and brown-tail moths, the death-watch, and many others, have all been the subjects of his fears. But the dread excited in England by the appearance, noises, or increase of insects are petty apprehensions when compared with the horror that the presence of the Acherontia occasions to some of the more superstitious natives of Northern Europe. A letter is now before me from a correspondent in German Poland, where this insect is a common creature, and so abounded in 1829 that my informant collected fifty of them in the potato-fields of his village, where they call them the "Death's-head Phantom," the "Wandering Death-bird," &c. The markings on its back represent to their fertile imaginations the head of a perfect skeleton, with the limb bones crossed beneath. Its cry becomes the voice of anguish, the moaning of a child, the signal of grief. It is regarded not as the creation of a benevolent Being, but the device of evil spirits, enemies to man, conceived and fabricated in the dark; aud the very shining of its eyes is thought to represent the fiery element whence it is supposed to have proceeded. Flying into their apartments in the evening, it at times extiuguishes the light, foretelling war, pestileuce, hunger, death, to man and beast.—*Journal of a Naturalist.*

DR. KNAGGS describes, in the *Entomologist's Monthly Magazine* for January, a species of Noctua (*Agrotis helvetina*) uew to Britain. Several specimens were captured in the middle of November last, near Derby. This is a rare species abroad, but has been known to occur in Germany, France, Switzerland, &c. The larva is unknown.

NEW SPECIES OF RAIL.—The President of the Zoological Society describes a new species of Rail, to which he has given the name of *Porzana bicolor*, in the January number of the *Magazine of Natural History*. Its colour is chiefly grey, especially on the lower parts of the body, the upper beiug ferruginous-olive and dark slate-colour. It was shot at Rungbee, Darjeeling.

BLIND ANIMALS OF THE KENTUCKY MAMMOTH CAVE.—In the *American Naturalist* for December last, there is given a lengthy and interesting description of the various creatures found living within this famous cavern. The fishes, all of which are blind, will be described in a future number. One beetle (*Anopthalmus*) was totally blind, and in another (*Adelops*) there were only pale spots, or rudimentary eyes. A wingless grasshopper (*Rhaphidophora*) was found jumping about with great alacrity. A species of Campodea was also discovered hiding under stones in damp places, and this too was eyeless. A small spider, white and very small, was in the same condition. The "Harvestmen" were represented by a species (*Acanthocheir armata*), also white, and equally blind. A myriapod was found haviug rudimentary eyes. Most iuteresting, however, are the blind crawfish (*Cambarus pellucidus*), in which the eyes are rudimentary in the adults, but much larger in the youug. The writers think that this is an evidence that the inheritance of the blind condition is probably due to causes first acting ou the adults and transmitted to the young, ending in the production of offspring that becomes bliud through habit. The strangest of those eyeless creatures mentioned, is, perhaps, an isopod (*Cæcidota*), inasmuch as it is nearly allied to species in the Austrian caves, which are iu a similar conditiou.

THE LIVER.—In reply to "Inquirer," in your January number, I beg to say that the sketch here-with, from a copy of a seal of the borough of Liverpool, of early date (circ. 1350), appears to supply the information requested. The device is the Eagle of St. John, the label held in its foot being inscribed with the name Iohes. In the beak is a conventional leaf or flower, which I believe is copied as a seaweed in the recent rendering of the bird. If the original is not much like a living bird, it will still be found to retain so intermediate a position between the natural and heraldic forms as to require but a very small stretch of imagination on the part of "Inquirer" to trace the descent. I am aware that to account for the name of the town an imaginary bird, the *Liver*, has been suggested, and the Cormorant and Ibis have been severally assumed to be the prototype of the Liver. But the Cormorant is too common a bird to have attracted attention there; and the occurrence of the Ibis cannot, I fear, be proved to have been observed in either Lancashire or Cheshire.—*T. G. Bayfield.*

Fig. 32. Ancient Seal of the Borough of Liverpool (circa 1350).

The Liver (p. 22).—The bird figured in the armorial bearings of the town of Liverpool, according to Burke, is a *cormorant*, holding "in his beak a sprig of *laver*, vert." The word "laver" is a common synonym for "sea-*wrack*," but most generally applied to the "Porphyra," a genus of seaweed sometimes prepared as a condiment; but the green laver (vert) is *Ulva latissima*, a species of *algæ* with very large fronds. I have no doubt that this *laver*, taken with reference to the "Porphyra," has originated the idea of a *liver*-coloured bird, that finds such favour with certain etymologists; but it is hardly fair to argue seriously about *heraldic* animals. The cockatrice, the dragon, and the wyvern have long since been consigned to the regions of fable; and the real royal Li-Ver, whether we may suppose it should resemble a cormorant, a crane, or a heron, is equally fanciful.—*A. Hall.*

MICROSCOPY.

Test Scales.—In answer to your correspondent "S. L. B." I can assure him that the "test scale" to which he refers *is* obtained from Lepidocyrtus, and from an insect, entomologically speaking, exactly coinciding with *L. curvicollis.* I can also assure him that no amount of age will develop the "test scale" upon the ordinary *L. curvicollis.* The habitats of the two insects are different; I have found both, and last autumn mounted a large number of "test scales," any of which will, I doubt not, convince "S. L. B." that they are not of the ordinary kind.—*Joseph Beck.*

Recent Formation of Flint.—In a sounding made by Capt. J. Perry, of Liverpool, at Porto Seguro, Brazil, mixed with some rare and curious diatomaceous forms, may be found several species of Foraminifera and Entomostraca. The addition of nitric acid for the purpose of cleaning and preparing this material for mounting has brought to light the very interesting fact, that many of the chambers of the shells of the Foraminifera, and, in some cases, the carapaces of Entomostraca, were filled with silex, bearing considerable resemblance to ordinary flint. The recent siliceous casts of Foraminifera hitherto detected have all been of a dark green colour, resembling the foraminiferous casts found in the greensand. The forms found in the Porto Seguro material were Orbitolites, Miliola, and Rotalina.—*F. K.*

Eels in Paste.—In the absence of other forms of microscopic life during the chill, dark days of winter, the young microscopist will find both instruction and amusement in studying the development of the so-called "paste-eels"; and the following hints as to the method of obtaining them may therefore be of service. The paste must consist of flour and water only. The pastes sold in shops usually contain resin—this is fatal to the production of the "eels." The paste should be made thick, and boiled; when cold it should be well stirred and beaten with a wooden spoon, and this process must be repeated daily to prevent the growth of mould; it is necessary, however, to examine a portion, to ascertain if it contains eels. In warm weather a few days will generally produce a plentiful supply; in cold weather a longer time is necessary. If the paste is too thin, they will creep up the sides of the vessel, and it will be necessary to place them on some thicker paste. The young eels exhibit very faint traces of internal structure, but as they increase in size the mouth and alimentary canal may easily be seen; and in the mature forms the embryo young may be detected coiled up within. The only preparation necessary for observing these forms is to place a little of the paste in a little clean water, either in the live-box or on an ordinary glass slip, and cover it with a piece of thin glass. These animalcules may be kept for years if a little fresh paste is occasionally added.—*F. K.*

THE MARKINGS ON THE BATTLEDORE SCALES OF POLYOMMATUS ALEXIS.—In a paper read before the Royal Microscopic Society, Dec. 6, 1871, by Dr. J. Anthony, the author states he had long felt assured that the ordinary coarse representations of the battledore scales were most imperfect and erroneous, and he had therefore proceeded to examine, under various conditions, of and with the best optical appliances. His observations extended over several months, aad after the elimination of all probable sources of error, he has satisfied himself that the remarkable structures exhibited by these scales were not in accordance with the usual representations of them. The objectives used were an eighth and twelfth; with these powers, and light free from all obliquity, he observed the dots on the ribs of the scale bore considerable resemblance to the glands on Anagallis [as represented in the author's figures, they bear no inconsiderable resemblance to dumb-bells]. As the columns are perpendicular to the plane of the scale, the head column and base are in the same axial direction, and it is therefore necessary to find a scale slightly tilted up or doubled over to detect the true nature of the dots. The author's observations are illustrated by two whole-page plates of figures.—*Monthly Microscopical Journal, January*, 1872.

PLEUROSIGMA.—At the November meeting of the East Kent Natural History Society, Col. Horsly continued his experiments on the effects of different modes of illumination, especially as regards the appearance of the lines or markings on the valves of *Pleurosigma angulatum*, *P. quadratum*, and *P. Hippocampus*, using a ¼-inch objective and transmitted light. The results were so remarkable as to throw doubts on the taxonomic value of the current description of the direction of those markings. Thus in the two former species the markings appeared either transverse or oblique, according to the direction of the light (or rather according to the position of valve). In *P. Hippocampus* the lines always appeared longitudinal and transverse. This apparently optical deception admits of a very simple explanation—those forms with oblique striation, the second row of dots mocking the first; thus,

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If a valve is nearly at right angles to the illuminating pencil, the lines appear oblique; if in the same direction as the ray, they appear transverse. *P. Hippocampus*, and all forms described as having longitudinal and transverse striæ, have the dots arranged in this manner,

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; and, of course, the striæ, from whatever direction they receive the illuminating ray, can never appear oblique. The ease with which the transverse or longitudinal lines are resolved depends upon the closeness of the dots; if they are closer in a transverse direction, the longitudinal striæ are more easily seen; if in a longitudinal direction, then the transverse striæ are more easily seen.—*F. K.*

"THERE is a special provision made by Nature for the Mangrove. The seed drops at the proper season, and is in danger of being carried away by the stream from the muddy bank on which alone it could grow; but it is possessed of a small rootlet, by which it can attach itself at once to the swampy ground, and remain there at security. These rootlets are put forth, and the stem gradually rises up from the midst, and another mangrove is added to the great belt of trees that lines the bank."—"*Beautiful Birds in Far-off Lands.*"

"IN the sunny regions of the tropics, Nature seems to preserve her freshness and beauty without interruption. There are no chilling winds or nipping frosts to scatter the foliage of the forest. As one leaf withers another takes its place, so that the green canopy is always full and compact. There is neither autumn nor winter, but perpetual summer reigns."—"*Beautiful Birds in Far-off Lands.*"

"IT becomes possible for us to determine, through comparison with those animals with which we are already acquainted, the homes or abodes of species yet unknown to us, or, by means of an exact knowledge of its locality, to determine in prospective the form and colour of a species."—"*Bird Life*," *by Dr. Brehm.*

GEOLOGY.

Cretaceous Reptiles.—In the *American Naturalist* for December, Professor Cope gives a vivid description of a geological expedition to Kansas, to explore the cretaceous strata. The account of nearly entire skeletons of extinct reptiles met with is most interesting. Among them were brought to light—the bones of pterodactyle, two species of Clidastes, a dinosaurian, a crocodile, and various species of fish; all new to science. One very large fish is described, furnished with a powerful dentition, which has been named *Portheus molossus*. This seems to have been very abundant in that part of the cretaceous sea, and to have been as much the dread of its contemporaries as the smaller saurians. One singular reptile was discovered, having affinities to the Turtle family. If such was the case, the remains indicate a total expanse of twenty feet. This animal has been named *Protostega gigas*. A large Clidastes was also discovered, whose skeleton was forty feet in length. Some of the reptiles mentioned, such as *Leiodon dyspelor*, a new species, are said to exceed in length the dimensions of any known reptile.

New Species of Fossil Coral.—Mr. Vicary, of Exeter, has just described a new species of fossil coral, allied to *Merulina*, in the upper greensand which caps the new red sandstone about five miles to the south-west of Exeter. He regards this as probably supplying a link between past and present forms of corals.

Trilobites.—Professor Van Beneden has recently read a paper on the systematic position of the King Crabs and Trilobites, in which he says that the analogy between the *Limuli* and the Trilobites, and the affinity which connects these two groups, cannot be doubted by any one who has studied the embryonic development of the former. He states that the *Trilobites* must be separated from the Crustacea, and form, with the Scorpions and other *Arachnida*, a distinct branch, the origin of which has still to be ascertained. There can now be little doubt that the Trilobites had articulated legs, like those of the Limuli.

Origin of Amber.—Professor Zaddach shows that the trees which yielded the amber must have grown upon the greensand beds of the Cretaceous period, flourishing luxuriantly on the marshy coast which then surrounded the great continent of Northern Europe. Probably the temperature was then much higher than it is now; and this even at that epoch extended to the now frost-bound Arctic regions, a fact which has been proved by the remarkable plant-remains of temperate climes which have been recently discovered there. The amber flora of the Baltic area under review contains northern forms associated with plants of more temperate zones; and thus camphor-trees (*Cinnamomum*) occur with willows, birches, beech, and numerous oaks. A species of *Thuya*, very similar to the American *Thuya occidentalis*, is the most abundant tree amongst the conifers; next in abundance Widdringtonia, a great variety of pines and firs, including the amber pine: thousands of these, it is supposed by the professor, might have perished, and while the wood decayed, the resin with which the stem and branches were loaded might have been accumulated in large quantities, in bogs and lakes, in the soil of the forest. If the coast at that time was gradually sinking, the sea would cover the land, and in due course carry away the amber and masses of vegetable *detritus* into the ocean, where it was deposited amidst the marine animals which inhabit it. But in higher districts the amber pines would still flourish, and so amber still continue to be washed into the sea, and deposited in the later formed greensand, and still later overlying formation of the "brown coal."

The Origin of Plants.—Messrs. Hall & Dana have recently shown that during the earlier part of the Upper Silurian period North America was covered by a great internal ocean. At the beginning of the Devonian period a slow and gradual emergence commenced, and eventually the dry land was covered with a peculiar and abundant flora. One genus of plants, *Psilophyton*, is common to Germany, England, and North America. The comparison of fossil plants of the Devonian rocks of Europe and Canada is very difficult, on account of their having so limited an area in the former continent. The above authors believe that acrogenous plants allied to the Club-mosses, and perhaps such simple forms as *Eophyton*, extended back to the Primordial period, and that we may look for the actual origin of land-vegetation in the Laurentian epoch. The plants of the Lower and Middle Devonian are supposed to have the aspect of the remains of a decaying flora verging on extinction; whilst in the Upper beds there appear a great number of forms which afterwards were dominant.

A correspondent in the *Standard* has given an account of a fine specimen of ichthyosaurus recently found at Charmouth, Dorset. Its length was six feet, the orbits of the eyes being seven inches in diameter. Within the pelvic cavities of this individual were the fossil skeletons of four young ichthyosauri. This circumstance of the female ichthyosaurus being found fossilized with the fœtus *in situ* is not new, and from it is deduced the conclusion that they were viviparous.

NOTES AND QUERIES.

WHITE ANTS.—A friend of mine has his house infested by small white ants. Can any of your readers inform me how they can be got rid of?—*P. W. Rogers.*

WHITEBAIT.—A good suggestion has been made by Mr. J. K. Lord, in *Land and Water*, to the effect that an experiment should be made in the Crystal Palace Aquaria whether all the fish called "whitebait" grow up into herrings, sprats, shods, gobies, smelts, &c.

EARTHWORMS.—In last month's SCIENCE-GOSSIP, your correspondent E. P. P. wishes to know of more authorities on the subject of worms. I find that an anonymous writer in a series of papers in a magazine of some few years back, gives the following account of the common earthworm. (He is talking about a man being pained by cutting the worms in pieces with his spade.) "If some theories once current had been correct, this severing the body should have caused only the multiplication of the individual; for it was believed that each part contained vitality, and became a perfect animal. The progress of knowledge dissipated this idea, and established the belief, that if an earthworm be cut in two, only the piece which bore the head would be found alive after the lapse of a few hours; that on this segment a new tail would be gradually formed, and all appearance of injury, in time, effaced. It was also asserted, that 'if the division be made near the head, the body will remain alive, and will renew the head, and the head, with its few attached segments will die.'" The statement that the head will be thus renewed, has, however, been recently called in question in *A Report on the Structure, Habits, and Classification of the British Annelidæ*, by Dr. T. Williams. In this valuable communication it is stated, that "the views which commonly prevail with reference to the regenerative powers of these animals are greatly exaggerated, if not altogether incorrect. A true head is never reproduced. If a worm of any species, the *Nais filiformis*, for example, upon which the principal of my observations have been instituted, be cut into two parts, the anterior never reconstructs a true tail; nor does the posterior ever re-organize a true head; but both fragments will live for a considerable time, and the anterior extremity of the posterior fragment will suck in nourishment, swell in size, and become more vascular, while it preserves the distinctive organization of one of the middle rings of the body. It never re-forms a true head."—*H. A. A.*

ALAUDA ARBOREA.—How is it possible to describe this delightful bird, the Tree Pipit? The months of song are May and June; and if it be true that the Cuckoo at this time sings night and day, it is also certainly true that the Tree Pipit quite makes up by day for the short rest it takes by night. For the complete enjoyment of this bird's music, I will suppose the reader in a hayfield, redolent with sweet clover and grasses, and the many hundred odours of early summer. I would then draw his attention to a little bird on the top of the nearest tree, repeating three or four times in succession notes so like those of the canary, that it would be quite excusable to mistake them. He will then notice the producer of those sounds shoot suddenly upwards, like a sky-rocket, to the height of a hundred feet or more, flutter its wings like a wind-hovering kestrel, and so descend gently to the top of another adjacent tree, uttering all the while the softest cadence of half-notes it is possible to imagine. After a short rest, there will be a repetition of the canary song, another successful ascent, another quivering descent towards the top of the first or some other tree hard by, ever warbling in the most evident and wildest enjoyment its delicious diminuendo cadence from the top of its flight to the moment when it seizes the topmost twig of the selected tree. Colonel Montagu says this bird is rare in Cornwall, and Mr. Morris makes the same remark, but both are evidently in error; for in May and June, in this neighbourhood, no other bird of passage is so common, and certainly no other to be compared to it for general interest. How long it stays here I cannot tell, for it ceases singing the end of June or beginning of July, and then I am unable to distinguish it from the titlarks. Evidently *Alauda arborea* is a much more appropriate name for it than *Alauda trivialis*, as it frequents woody and rich districts, and not crossways and downs, like skylarks and titlarks. I hope every reader of these remarks, who is not already familiar with this bird, will make it a point of becoming so next hay-season; the song and flight are so peculiar, that it will be impossible to mistake it for any other.—*Joseph Drew, Nansladron.*

VITRINA PELLUCIDA.—Can this species withdraw itself completely into its shell? Our most recent manual—Tate's "Land and Fresh-water Mollusks"—adopts the negative side, but without giving any fact or authorities. Having considerable doubts on the matter, I consulted such works as I possess or have access to, and the following is the result. Our standard authority—Mr. Jeffreys, in his "British Conchology"—writes, "the whole of the body can be withdrawn into the shell." MacGillivray, a careful and accurate observer, in his "Mollusca of Aberdeenshire," says, "when young, very active, and incapable of withdrawing entirely within the shell; but when full-grown, as I have observed, it can withdraw itself completely." In Reeves's "British Land and Fresh-water Mollusks," the author offers no opinion, but adduces M. Moquin-Taudon in the affirmative; and Mr. Berkeley, "who has observed this mollusk with great attention, and published its anatomy in the "Zoological Journal," in the negative. We have thus—Jeffreys, MacGillivray, and Moquin-Tandon, who consider that it *can* withdraw completely into its shell, and Tate and Berkeley, who say that it *cannot*; the balance being decidedly on the affirmative side. With the light of MacGillivray's observations before us, may not Messrs. Tate and Berkeley have drawn their conclusions from immature specimens? I offer this as a possible solution only. I will conclude with a note of a fact that came under my own notice. In one of my conchological rambles in November, 1871, I met with half a dozen very fine *V. pellucida*, which I put into a chip box. On my return home the box was placed on a sideboard in a room in which was a fire. Opening the box a few hours later, I found each animal had withdrawn into its shell, leaving the latter adhering to the side of the box by a slight film of mucus round the edge, as is the invariable habit of the genus Helix and others under such circumstances. But though able to *retract completely into its shell*, it cannot, seemingly, do so to the same extreme extent as the generality of the univalved mollusks, and leave a considerable space within the aperture between it and the animal. I have never met with this species in a hybernated state, nor heard of any instance. I do not think that it hybernates at all; its hardy nature renders such a resource unnecessary. But I am inclined to think that it æstivates in extremely hot and dry weather, though I cannot remember having met with it in that state naturally. Perhaps some of the readers of SCIENCE-GOSSIP can throw a little light on this part of its economy.—*F. G. Binnie, Herlaugh Lodge, Tadcaster.*

MICE IN TRAPS.—Your correspondent "Philomys," in last month's number of SCIENCE-GOSSIP, notices the fact of mice dying whilst uninjured in live-traps. That this occasionally, but not generally, happens, must be known to most persons who have employed live-traps for the capture of these vermin; but it does not appear to me, from actual observation, that the little creature "seems to resign itself to its fate, and at once die." On the contrary, I have always found the dead mouse to be bathed in perspiration, giving out a most unpleasant odour; and I infer that death is the result of the fearful but vain struggle to escape from the prison-house, and is most probably caused by the rupture of some internal organ. The sufferings of mice in the grasp of a cat are possibly not so severe as we should naturally imagine, for in Livingstone's "Missionary Travels in South Africa," p. 12, the doctor describes his own sensations when caught by a lion. "The shock produced a stupor, similar to that which seems to be felt by a mouse after the first shake of the cat. It caused a sort of dreaminess, in which there was no sense of pain nor feeling of terror, though quite conscious of all that was happening. The shake annihilated fear, and allowed no sense of horror in looking round at the beast. This peculiar state is probably produced in all animals killed by carnivora, and, if so, is a merciful provision by our benevolent Creator for lessening the pain of death." —*W. R. T., Scarborough.*

WHITE VARIETIES.—In your last, Mr. Blow speaks of the *Cichorium Intybus*, with white flowers, as an uncommon plant. I may state that previous to so much building round the town of Epsom, it was not unfrequently met with in the Parade Fields. About three years ago, I found at Half-mile Bush (Epsom) the *Solanum Dulcamara*, with white flowers and yellow berries. I went after it this last season, and although I found, in the same locality, plants with purple flowers and red berries, I could not see a vestige of the white variety I have alluded to, and would suggest whether plants may not sport from coloured to white, and, under favourable circumstances, return to their pristine condition.—*W. T. Iliff, Epsom.*

ERGOTIZED GRASS.—When I sent to SCIENCE-GOSSIP the notice of the ergotized *Alopecurus agrestis* the weather was fine and open, and I never dreamt of all the frost which has followed. This frost, I am bound to say, scattered all the ergot in a few hours, having left the affected culms perfectly bare of ergot and seed; and of course the cold has not let any fresh ergot become developed. These facts I was first led to suspect on noticing that the crops of a brace of partridges shot in the field were literally stuffed with the ripened seeds and ergot from the grass; and upon going to look for it in the field, I was vexed at finding it all destroyed. I mention this that you may kindly, in your next number, intimate to my numerous correspondents the cause that I have not responded to their request for specimens. I sent you all that I had gathered before the frost came, and will, if possible, satisfy my friends either with the ergot or something of interest, as I should be sorry to appropriate their stamped envelopes.—*Jas. Binkman.*

SHREW-MOUSE.—In Staffordshire, this much-persecuted little animal is called the Nursrow. Bailey's Dictionary gives another odd name, viz. Shrove-mouse, and defines a shrew-mouse as "a field-mouse of the bigness of a rat, and colour of a weasel, very mischievous to cattle, which going over a beast's back will make it lame in the chine; and its bite causes the beast to swell to the heart and die." Bailey derives shrew-mouse from the Danish *skoumusz;* but, as applied to a scolding woman, derives shrew from the Teutonic *scheyren* (modern German, *schreien*), to make a bawling. Webster gives as the derivation of shrew, used in either sense, the Saxon word *screawa*. Which is correct? —*G. H. H.*

A RARE FISH.—In a recent number of *Land and Water* there was a note on the capture of a rare fish off the Northumberland coast—the Long Flounder (*Platessa elongata*). Only four or five specimens of this fish are on record. It is still more singular to find it ranging so far north as Northumberland. The specimen has been placed in the Newcastle Museum.

STAG-BEETLE.—Has "A. E." (SCIENCE-GOSSIP, p. 283, vol. vii.) ever been bitten by a stag-beetle? His observations would imply as much without actually asserting it. They were numerous where I formerly lived, and I have often tried to get them to bite a stick, but never succeeded in doing so; indeed, the insects always appeared remarkably inoffensive, and, so to speak, tame. Notwithstanding the formidable appearance of the masculine mandibles, their length would rather tell against their power; and I should certainly feel more shy of a nip from the less imposing, but I suspect more effective, jaws of the female.—*G. Guyon, Ventnor.*

PROCESSIONARY MOTHS (pp. 106 and 184, vol. vii.). —In the first of these articles we are told, after naming the three species of the so-called "Processionary Moths," that "neither of the species is found in England;" and in the latter, that the larvæ have made their appearance in a garden in Dorset "for the last dozen or fourteen years." It is well known to those who have paid attention to insects, that the species in question are none of them British. Are we to understand by the communication of our fair friend that these species of caterpillars were introduced, and are now thriving in her garden? I suspect the caterpillars of the Lackey-moth (*B. Neustria*), and not the Processionary Moth, are those observed in Dorset. It is a well-known fact, that several species of caterpillars found in England possess an urticating nature from the spines adorning their bodies; amongst which those of *A. Caja*, *L. auriflua*, *B. trifolii*, and many others, are familiar examples to those who are in the habit of rearing them.—*G. B. C., Ringwood.*

TALKING BULLFINCH.—A male bullfinch, in the possession of Mrs. Cooke, Old Catton, Norwich, can speak three separate sentences,—"Come along," "Look here," Pretty, pretty, pretty dear," the first very distinctly.—*W. B.*

RING OUSEL.—It is not a very uncommon occurrence to see the Ring Ousel in Dorset and Wilts during the autumn months. These birds visit the mountainous districts of this country in the spring of the year, travelling southward as the autumn approaches. About six years ago, a gentleman caught one of these ring ousels, near Cerne Abbas. If I remember rightly, it was towards the end of November, during very inclement weather. The bird was a very beautiful specimen of the male *Turdus torquatus*, and was in my mother's possession for some time. We christened him Charlie, after the donor, and he became one of our best-loved household pets. In a very few weeks Charlie lost all his natural shyness, and became charmingly attractive. He would come to the side of his cage and utter a peculiarly clear strong note, almost like the song-note of a thrush, and beg to have his head rubbed. He would peck crumbs out of my mother's hand in the most delicate gentleman-like manner imaginable. We fed him like our other birds, on mixed seeds, home-made German paste, &c., and he appeared well and happy. His end was most untimely and sad. A neighbour's cat, having a *penchant* for birds, attacked the cage one day, and succeeded in putting an end to poor Charlie's existence, as well as killing two canaries, who shared his home, and were great friends of the ring ousel.—*Barbara Wallace Fyfe, Nottingham.*

BOMBYX QUERCUS. — I have personally experienced the urticating property of the hairs of *B. Quercûs*, noticed by your correspondent in last month's SCIENCE-GOSSIP. I opened some cocoons of this species, and both my brother and I got the hairs from the cast skin of the caterpillar into our hands and faces, causing considerable irritation. I have been told that it is only the hairs of the female larvæ that are irritating, but I don't think so. I had often previously handled the caterpillars without getting the hairs into my skin.—*Harry Leslie.*

BIRTH AND DEATH OF A HIPPOPOTAMUS.—An interesting event took place at the Zoological Gardens on the 9th of January. A baby hippopotamus was born, and great endeavours were made to keep it alive, but in vain. The little animal was unable to suck, and after three days it died from lack of nourishment. Some difficulty was experienced in getting the baby away from its mother, and when it had been safely placed in the hands of its foster-parent, Mr. Bartlett, the indefatigable curator, managed to get about a pint and a half of milk down its throat. It was too far gone, however, to rally, and died almost immediately. The young hippopotamus could swim as well as its mother.

GEOPHILUS ELECTRICUS.—The following notes on an electric centipede, which I kept in captivity for some days a few years ago, may prove interesting to your correspondent Mr. Henderson:—" October 13th, 1869. A friend brought me an electric centipede (*Geophilus electricus*) this evening. He found it on Primrose Hill. I laid it on some damp earth in a small glass jar. When I breathed on it, it writhed about and became luminous. The luminosity had sometimes a greenish, sometimes a bluish tint. The green seemed to be confined to the head and the blue to the body; but of this I am not sure, for the colours were usually so intermingled, and the difference between the shades was so slight, that it was almost impossible to distinguish between them. The power of showing light appeared to be weakened by frequent exercise. After a time my breathing on the centipede only caused its head to become luminous, and at length the luminosity entirely ceased. 14th. This morning I took the centipede into a dark closet, and breathed on it two or three times, but with no effect. In the evening my breathing on it had the same effect as it had last night. First its whole body became luminous, after a time only its head was lighted up, and at length it showed no light at all. 15th. To-night it again showed its light, but not so brightly as heretofore. 16th. This evening also the centipede became luminous, but not so brightly even as last night. I think the insect was injured in some way by the roughness of its captor. It appears to me to be dying. 20th. I have not been able to make any observations during the last few days, and this morning I find the centipede is dead." These notes were not made from memory, but at the time, and may therefore be depended on. It will be seen that the insect lived in captivity exactly a week. It never showed any disposition to crawl from the spot on which it lay when first put into the jar, and never moved, I think, except when breathed upon, or otherwise disturbed. This inertness I attribute to its having been injured when it was taken.—*John Landels.*

A. ATROPOS, PUPA.—Your correspondent "E. L." may succeed in breeding perfect specimens of *A. atropos* by placing the pupa in a hat-box containing damp moss, which should be kept moderately warm near a fire. *Sphagnum* moss is the best for the purpose, and it should be prepared by baking it, to destroy any insects it may contain. Without sufficient moisture the moth cannot break through the pupa-case. If not forced in this way, but allowed to remain in the pupa state during the winter, they seldom come to anything in the following year.—*H. A. Auld.*

DAYLIGHT AURORA.—On Friday, January 5th, about four p.m., I observed a peculiar appearance of the sky in the N.E. It consisted of fine dark rays, or stripes, coming apparently from a centre not far below the horizon. A friend of mine observed a similar appearance on Saturday, the 6th, at the same hour. Have these phenomena any connection with "aurora by daylight," mentioned in your last number?—*Julia Colson, Swanage.*

THE UNICORN.—I was much interested in Mr. Kitton's article on medieval science. These historical reflections are useful as indicating the degree of real progress which has been made. If it is not outside your province, I should like to be informed if there is any connection between the unicorn, employed as a supporter of the British arms, and that figured in Mr. Kitton's paper from the seal of Margaret of Scotland? The latter, it will be remembered, was given to illustrate the medieval tradition of how the fabulous animals were caught.—*T. E.*

MALVERN NATURALISTS' CLUB.—The Rev. W. Symonds, F.G.S., who has presided over this club so admirably for eighteen years, has at length retired. The members have shown their sense of Mr. Symonds' merit by presenting him, after a luncheon given for the purpose, with a splendid silver epergne. To Mrs. Symonds, on the same occasion, was presented a capital portrait of her husband. The address from the members set forth the great obligations under which the club laboured to Mr. Symonds, for his able and long presidency. The presentation was made, on behalf of the club, by Sir William Guise, Bart., President of the Cotteswold Naturalists' Club.

Bony Excrescences in Skin of Turbot.—Can any of your readers inform me of the use of the bony excrescences in the skin of the common turbot? They are scattered at too great distances to be of any service as defences. These bodies are chiefly confined to this and other species of fish, all of which I believe are what are commonly called "flat-fish." —*H. B.*

Partridge's Flight.—The velocity of the Partridge's flight is curiously illustrated by an occurrence recently communicated to me by a friend. A covey of partridges got up in a field and flew off towards a road, along which ran the telegraph. One of the birds was observed to strike the wires and fall, after continuing its flight a short distance. On being picked up it was found that the wire had completely severed the head from the body. The bird was a fine cock partridge, and the spot where it had fallen was twenty-two yards distant from the telegraph.—*G. H. H.*

Singing Mice.—It appears to me, from personal observation, that the phenomenon of the so-called singing mouse must be referred to some other cause than that of happiness. Two cases have fallen under my notice. The first mouse was caught in a live-trap, and soon drew attention to itself by the peculiar sounds it uttered. It is some years ago, but I remember the huddled-up form which it assumed, and the apparent indifference to anything which it manifested. I forget whether it ate food in captivity. It lived but a short time, continuing the sound in the presence of a friend. The second mouse was noticed under a sofa, and when attempts were made to capture it, it would merely run to the other end of the sofa, and, assuming the same huddled-up form, continue the sound. This was killed whilst being captured; but both gave me the idea of their being diseased and wretched. I would rather refer the cause to disease of the respiratory organs,—in fact, call it a kind of wheezing. Something analogous to this occurs to an old lady of my acquaintance, who is liable to a peculiar affection of the bronchial tubes, which produces a constant twittering or chirruping, reminding one strongly and ludicrously of a bird. This is called by the lady herself "the little bird in her throat." There is also a resemblance between mice in this state and birds at certain seasons, which favours the theory of their being under the influence of the tender passion. A goldfinch, in particular, that was in my possession for several years would, at a certain time every year, puff up his body and ruffle the feathers, keeping up, at the same time, an incessant twittering, increasing the sounds vehemently on my approaching the cage. I have every reason to believe that rats utter the same sound, but in a lower key.—*H. J. Bacon.*

Arborescent Silver.—I have prepared many of these beautiful slides as described by "F. K.," Science-Gossip, p. 17, but finding it very difficult to remove the piece of copper wire without disturbing the crystals, I adopted the plan of using a long piece of thin copper or brass wire, and bent a portion into a T shape to rest on the table, or the coil itself did as well, the end of the wire being bent down to touch the slide in the centre of the drop of nitrate of silver solution. When the feathery deposit of metallic silver was formed, the finger or a pencil passed under the wire would raise it without disturbing the crystals, it being simply a perpendicular lift. If the action is continued too long, a blue tinge will result from the formation of nitrate of copper. By using different thickness of wire and strength of solution various effects are obtained.—*G. Guyon, Ventnor.*

Oak Eggar.—I believe the urticating properties of the Oak Eggar (*B. Quercûs*) larvæ are more known than "E. H. S." thinks, for in the south of Devon it is a very common insect: the side hairs are those that are injurious. I have taken one of those creatures in my hand with a kid glove on, and the hairs so stuck into the glove that every time I used it I had a fresh sting, and the irritation continued for several weeks. The larvæ of the Fox (*L. Rubi*) has the same properties, only stronger; even touching the cocoon of either larvæ, which is composed partly of the hairs of the caterpillar, the fingers are stung. As to the effect only occurring on persons of delicate health that is not correct, but it may be more painful on fine skin. If the insect is handled very tenderly, there will not follow any inconvenience.—*J. G.*

Podura Scales.—I have in my collection and now take especial care of it, a slide of test scales of the Podura, mounted by the late Mr. R. Beck. I remember him telling me that he found the Podura in the rock-work in his mother's garden. He was, as is well known, a keen observer, and might thus make discoveries which would escape the notice of some. After reading Mr. M,Intyre's excellent article in Science-Gossip, I commenced a hunt for them, and in the cellar found a lead-coloured species, some few of which yielded a scale equal to Mr. Beck's. I must, however, say that I did not get one slide in twenty, nor one scale in five thousand, that was of any use. Perhaps it is this difficulty in meeting with well-marked scales which makes "L.L.B." doubt if they can be found. In Mr. Beck's slide I notice there are only two well-marked ones. Perhaps, as suggested, the age of the insect has something to do with it. At all events, they appear the exception, not the rule.—*E. G., Matlock.*

A Rare Plant.—At page 168 of your vol. for 1867 is a notice of that curious plant *Phyllactidium pulchellum*, and as localities were asked for, it may be worth while to state that it is very abundant in the neighbourhood of Chester. While examining recently some anacharis under a low power, I observed the under surface of the leaves thickly dotted with it, in some cases forming a riband nearly the length of the leaf. The anacharis was taken from an out-door tank supplied with water from the Dee. It has also been found in one or two ponds in this neighbourhood.—*C. Mills.*

Initial Letters.—The following is the reply of the Secretary of the Post Office on this important subject:—*Vide* paragraph 200, page 133, *British Postal Guide.* "Letters addressed to 'initials' at the Poste Restante, or to a District or Branch Office, are returned to the writers." This does not apply to receiving-houses, where the letter-receivers may take in letters addressed to "initials" if they consider that they would be justified in so doing. At Provincial Post Offices also, the postmasters may take in letters addressed to "initials" if they think proper.

NOTICES TO CORRESPONDENTS.

All communications relative to advertisements, post-office orders, and orders for the supply of this Journal, should be addressed to the Publisher. All contributions, books, and pamphlets for the Editor should be sent to 192, Piccadilly, London, W. To avoid disappointment, contributions should not be received later than the 15th of each month. *No notice whatever can be taken of communications which do not contain the name and address of the writer*, not necessarily for publication, if desired to be withheld. We do not undertake to answer any queries not specially connected with Natural History, in accordance with our acceptance of that term; nor can we answer queries which might be solved by the correspondent by an appeal to any elementary book on the subject. We are always prepared to accept queries of a critical nature, and to publish the replies, provided *some* of our readers, besides the querist, are likely to be interested in them. We do not undertake to return rejected manuscripts unless sufficient stamps are enclosed to cover the return postage. Neither can we promise to refer to or return any manuscript after one month from the date of its receipt. All microscopical drawings intended for publication should have annexed thereto the powers employed, or the extent of enlargement, indicated in diameters (thus: × 320 diameters). Communications intended for publication should be written on one side of the paper only, and all scientific names, and names of places and individuals, should be as legible as possible. Wherever scientific names or technicalities are employed, it is hoped that the common names will accompany them. Lists or tables are inadmissible under any circumstances. Those of the popular names of British plants and animals are retained and registered for publication when sufficiently complete for that purpose, in whatever form may then be decided upon. Address, No. 192, Piccadilly, London, W.

R. V. T.—Mosses. 1. *Plagiothecium elegans*; 2. *Trichostomum littorale*; 3. *Bryum atropurpureum*, with *B. intermedium*.—*R. B.*

A Constant Reader asks whether Stephens really inserted in his "Illustrations of British Entomology," the six orders of Diptera, Homaloptera, Aphaniptera, Aptera, Hemiptera, and Homoptera? [In reply we beg to state, that the orders named were not included in Stephens's "Illustrations," except a few plates of Diptera, with descriptions of the species at the end of the work.]

S. A. D.—A great deal is left to taste in the arrangement of dried plants. You can fasten them by thin slips of paper gummed at each end, which may be carried across the fruit-stalks of the mosses. More than one specimen of the same moss, or more than one species of the same genus, may be mounted on the same sheet, if there is space enough. We don't know there is any particular rule as to their separation of the genera. Have them to succeed each other in their allied order, as you will find them in all good works on muscology.

Will A. E. M. kindly communicate his address to the Editor?

P. A.—*Obsidian*, or "Volcanic glass," a peculiar igneous rock, whose appearance is due to the rate at which it cooled.

T. Johnson.—Seeds of common Goosefoot (*Galium aparine*).

H. J.—The shells sent are, 1. *Littorina rudis*; 2. *Tellina Balthica*, a shell especially abundant in the Baltic and German Ocean.

H. Gilbert.—The growths attached to confervæ on the slide sent are diatoms, *Gomphonema tenellum*.—*F. K.*

J. B. L.—The fungus on the leaf of *Chærophyllum temulum* is a *Sphæropsis*.

Rev. G. Pinder.—Not insects' eggs at all, but a fungus, a *Nectria*, probably *Nectria Cinnabarina*. The spores, which are present in great quantities, will determine the species.

J. G. sends plants with yellow flowers found on sandhills, and having excrescences full of larvæ, on which sparrows feed greedily. The excrescences, or galls, are produced by *Aulax Sabaudi*, Hartig, one of the Cynipidæ. The gall is many-celled, and probably would produce twenty or thirty flies in the spring. The plant is either *Hieracium subaudum*, or *H. umbellatum*, on both of which the *Aulax* occurs.

Philip Barker.—You will find all the information you require concerning object-glasses and angular aperture in the last volume of the *Microscopical Journal*.

J. P.—1. *Poa subcærulea*; an alpine, or starved variety of *P. pratensis*. 2. The supposed *Juncus* is really part of two plants, one resembling a variety of *Poa nemoralis*, the other a portion of *Scirpus*.

E. F. B.—The larva found crawling on the pavement is that of a *Telephorus* (Soldier-beetle), either *T. fuscus* or *T. rusticus*. It is very carnivorous.

J. M. H.—Young larvæ of the Burnet Moth, which were hatched and died soon afterwards.

W. B. S.—Next month.

EXCHANGES.

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

Exchange.—*V. Urticæ*, *Galathea atalanta*, *Ocellatus*, *S. Populi*, *Caja*, *Lubricipeda*, *Minthastri*, *Bucephala*, *Vinula*, *Quercus*, *Grossulariata*, *Gamma*, *S. Ligustri*, pupæ of *S. Populi*, *Ocellatus*, *Bucephala*, for pupa of *Carpini*.—R. Garfit, Market Square, Alford, Lincolnshire.

No. 34, 80, 397, 1087, 1223*, 1255, 1296, 1307, 1353, 1364, &c. in exchange for other British Plants.—Apply to J. A. 59, Woodhouse Lane, Leeds.

Achatina acicula, in exchange for other British shells.—Address, Hugh Perkins, Sibford, near Banbury.

Exchanges wanted of geological specimens of all formations.—Apply to Rev. Dr. Gloag, The Manse, Galashiels, N. B.

Can any one supply me with two or three specimens of each or either of the two following ferns:—*Hymenophyllum Tunbridgense* or *Hymenophyllum Wilsoni?* Any one doing so will greatly oblige T. B. Blow, Welwyn, Herts.

Vallisneria spiralis (growing plant) offered for a good mounted slide of crystals for polariscope.—Address, W. H. Gomm, Somerton, Taunton.

Eggs.—Gyr-falcon's, Merlin's, and Greater and Lesser White Heron's, &c., in exchange for other eggs.—Address, A. C. A., Post-office, Staines.

Wanted.—Unmounted specimens of British and Foreign Zoophytes (correctly named). Exchange given in microscopic slides. Send list to E. Ward, 9, Howard Street, Coventry.

Well-mounted Slides of Entomological specimens, Leaf Fungi, &c., for other good Microscopic objects. Lists exchanged.—J. Ford, Stamford.

Spicules of *Alcyonium digitatum* and *Spongilla fluviatilis*, mounted, in exchange for other good mounted objects.—John C. Hutcheson, 8, Lansdowne Crescent, Glasgow.

Spicules of *Gorgonia* and *Spatangus* for spicules of *Grantia compressa* and *Spongilla fluviatilis*.—Edith Meyrick, Downshire Lodge, Blessington, co. Wicklow, Ireland.

Coal-measure Fish remains for Devonian fossils.—G. W. Rowbotham, 2, Parsonage Street, Derby Street, Salford.

Wanted, Nos. 17, 47, 90, 93, 94, 105, 110, 170, 177, 209, 307, 309, Lond. Cat., for others.—Address, R. and T., Withiel, Bodmin.

Fungi, for plants of the same order. *Sphæriacei* preferred.—Charles B. Plowright, The Hospital, King's Lynn.

Eggs of Heron, Landrail, Goatsucker, and common Gull, in exchange for any unmounted Microscopic objects.—G. H. Stabington, Station Hill, Basingstoke.

European Coleoptera, named and mounted, offered for *named* British species.—W. H. Groser, 15, Thornhill Road, N.

British Land and Fresh-water Shells, in exchange for others.—Address, J. A. G., The Elms, Banbury, Oxon.

Turgis ciliata.—A beautiful opaque object for the binocular, for other good objects, mounted or unmounted.—T. H. Saunders, 34, North Fourth Street, Philadelphia, Pennsylvania, U. S.

BOOKS RECEIVED.

"The Canadian Entomologist."
"The American Naturalist."
"Rudimentary Magnetism." By Sir W. Snow Harris, F.R.S., &c. Second edition, revised by Professor Noad, F.R.S., &c. London: Lockwood & Co. 1872.
"Land and Water."

Communications Received.—C. E. B.—G. H. K.—J. F. R.—A. H.—G. G.—G. B. C.—G. H. H.—C. F.—T. G. B.—J. B. B.—C. M.—F. F. M.—H. G.—W. R. T.—F. G. B.—J. D.—W. T. I.—T. C. O.—J. B.—J. B. L.—J. A.—C. L.—E. F. E.—H. B.—T. E.—J. M. H.—W. B.—R. L.—H. L.—W. H. B.—C. L.—R. F. T.—J. C.—J. L.—H. A. A.—G. H. S.—W. D. R.—G. McL.—F. M. K.—H. J. B.—E. M.—J. C. H.—A. L.—C. B. P.—S. A. D.—W. B. S.—C. J. W. R.—C. C.—T. G.—W. P.—J. A. (Leeds)—J. E.—E. C. Lefroy (next month)—T. H. S.—S.—J. A. G.—W. H. G.—J. B.

COLLECTING AND PRESERVING.

No. II.—MOSSES.*

By R. Braithwaite, M.D., F.L.S.

IN making a collection of the vegetable productions of a country, we find considerable differences in the structure of the various groups of plants, and in the tissues of which they are composed; and hence special manipulation is requisite in dealing with certain orders. Some are of so succulent a nature, or have a framework so easily disintegrated, that they contain within themselves the elements of destruction, and present the greatest difficulty in satisfactory preservation, while others are so slightly acted on by external agents, that little trouble is required to prepare specimens of permanent beauty.

The Ferns and Lycopods, being generally appropriated by the collector of flowering plants, will be treated on with the latter, and following these come the Mosses, to which we will now direct attention, taking the alliance in its broadest sense, as including the three groups of Frondose Mosses, Bog Mosses, and Liver Mosses, or Hepaticæ, all of which are readily collected and preserved, and yield an endless fund of instructive entertainment to the microscopist. But it may be asked, Where is the game to be found? Where are the pleasant hunting-grounds in which they most do congregate? We answer, everywhere may some species or other be met with; yet, though many are cosmopolitan, the majority have their special habitats, and some their special seasons, both being considerably influenced by the presence of moisture.

Collecting.—The bryologist has one advantage over the phænogamous botanist, for it is not imperative that mosses should be laid out and pressed immediately; and hence less care is required in collecting them, than is bestowed on flowering plants; the necessary apparatus is confined to a pocket-knife, to remove specimens from stones or trees, a stock of stout waste paper, and a vasculum, or, better still, a strong bag, in which to carry the packets. When collecting the plants, it is well to remove any superfluous earth or stones, or to squeeze out the water from those found in bogs; and then each is to be wrapped separately in paper, and the locality marked outside; or the more minute species may, for greater safety, be placed in chip boxes. On reaching home, if we do not prepare the specimens at once, we must not leave the parcels packed together in their receptacle, or mould will soon attack them and spoil the whole; but we must spread them out on the floor until quite dry, and then reserve them to a convenient opportunity to lay out; as in the dry state they may be kept for years unchanged.

It often happens that our line of study is developed by some fortuitous circumstance. A neglected flowerpot in a corner of the garden attracts attention by its verdant carpet of moss, or, peeping over the wall, we see the crevices between the bricks bristling with capsules of *Tortula muralis*, the red-twisted peristome freshly brought to view by the falling away of the lid, and, taking a bit indoors to submit to the microscope, we are so captivated therewith that we then and there determine to become a

* Mr. Hardwicke has arranged to supply a mounted specimen illustrative of the above paper, and of the List of British Mosses now preparing, price Sixpence.

bryologist. Nor is this all that a journey round the garden will disclose: the neglected paths yield other species not less worthy of examination, and old apple-trees are not unfrequently tenanted by mosses.

Extending our walks to the commons, lanes, and woods, we may find on the ground and banks, in bogs and on the stumps and trunks of trees, a number of species greatly extending our list, while others again are only met with on the clay soil of stubble-fields; as various species of *Pottia* and *Ephemerum:* appearing in October, their delicate texture is developed by the constant moisture of winter, and with it also they vanish, to appear no more until the succeeding season. Travelling yet farther away, we find that each locality we visit yields some novelty: old walls and rocks of sandstone or slate, limestone districts, and above all, a mountainous country, are rich in species we seek in vain elsewhere. Here peat bogs, and rocks dripping with water, ever supplied by the atmosphere, or the tumbling streams everywhere met with, are the chosen homes of these little plants, and thither must the collector resort, if he would reap his richest harvest. Winter and spring in the lowlands, and a later period in the elevated districts, will be found most productive of fruiting plants.

Preparation of Specimens.—So rapidly does the cellular texture of the mosses transmit fluid, that, when soaked in water, we see them swell up and expand their little leaves, and in a short time they look as fresh as when growing; hence a basin of water, a towel, and drying-paper are all we require to prepare our specimens for the herbarium. If the tufts are large, we must separate them into patches sufficiently thin to lie flat, and by repeated washing, get rid of adherent earth, mud, or gravel. This is conveniently accomplished by holding the tuft in the palm of the hand, under a tap, and allowing a stream of water to pass through it; then by pressure in the folded towel we remove superfluous moisture and immediately transfer to paper, arranging the plants as we wish them to lie permanently, and placing with each a ticket bearing the name: a moderate weight is sufficient to dry them, as with great pressure the capsules split, and thus the value of the specimens is decreased. It not unfrequently happens that two or three species grow intermixed: these must be carefully separated at the time of soaking, and any capsules required to show the peristome must also be removed before the plants are submitted to pressure.

Examination of Specimens.—We have very much to learn about a moss before we can become masters of all the characters that pertain to it as a specific individual. We must observe its branching, the mode of attachment of the leaves to the stem, and their direction; the form and structure of a separate leaf, the position of the male flowers, and lastly the position and structure of the fruit. For the efficient determination of these we require a microscope (the simple dissecting microscope is amply sufficient), a couple of sharp-edged, triangular needles fixed in handles, and a few glass slides and covers. Having soaked our specimen in water, we lay it on a slide, and by cutting through the stem with one of the needles, close to the attachment of a leaf, we can readily remove the leaf entire, and two or three may be transferred to another slide, and placed in a drop of water under a cover: the same thing may be roughly accomplished by scraping the stem backwards with one of the needles; but in this way the leaves are often torn.

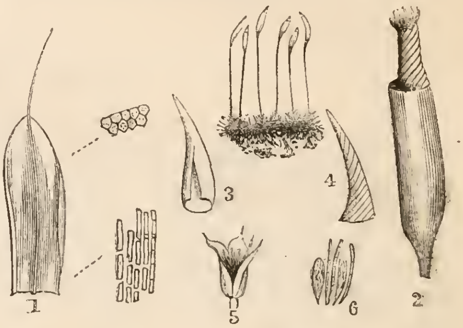


Fig. 33.—*Tortula muralis.*
1. Leaf and its areolation 2. Capsule. 3. Calyptra. 4. Lid. 5. Male flower. 6. Antheridia and paraphyses.

By examination of a leaf we notice its form, the condition of its margin, whether entire or serrated or bordered; the presence and extent of the nerve; and lastly, and most important of all, the form and condition of its component cells; and for this a higher power is required. With a ⅜-in. object-glass and C eyepiece we can observe their form, and whether their walls are thickened so as to render them dot-like; their contents, whether chlorophyllose or hyaline; and their surface, whether smooth or covered with papillæ; for often these points are so characteristic, that by them alone we can at once refer a barren specimen to its proper family or genus.

Preservation of Specimens.—This may be discussed under two heads:—1st, as microscopic objects; 2nd, for the herbarium.

1. The parts required for microscopic examination are the capsules and peristome, entire specimens of the smaller species, and detached leaves. The capsules having to be viewed by condensed light, must be mounted dry as opaque objects; and for this purpose I use Piper's wooden slides, with revolving bone cover; and in one of these we may fix a capsule with the lid still attached, another laid on its side, but showing the peristome, and a third with the mouth of the capsule looking upward, a position very useful for the species of *Orthotrichum,* as we are thus enabled to see the inner

peristome; and with them also may be placed the calyptra: should the cost of these be an object, a cheaper substitute may be found in shallow, blackened pill-boxes.

To preserve the leaves in an expanded state we may employ the fluid media used for vegetable tissues, or, when time is of consequence, Rimmington's glycerine jelly is a convenient material in which to mount them, a ring of dammar cement being first placed on the slide, and within this the liquefied jelly, to which the expanded specimen is quickly transferred, and the cover securely sealed by gold size. Preparations of this kind are of the highest value as types for comparison with actual specimens we may have for determination.

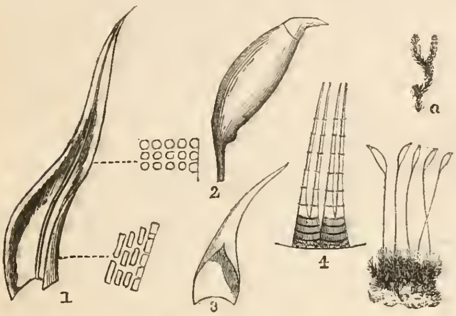


Fig. 34. *Ceratodon purpureus.*
a. Male plant. 1. Leaf and its areolation. 2. Capsule. 3. Calyptra. 4. Two teeth of the peristome.

2. In mounting specimens for the herbarium, we must be guided by the limits which we have fixed on for the extent of the same; and I may first describe the method adopted for my own collection. Every species has a separate leaf of cartridge-paper measuring $14\frac{1}{2} \times 10\frac{1}{2}$ inches, and on this the specimens are fixed, each mounted by a little gum on a piece of toned paper; thus 4 or 6 to 12 specimens, according to size, are attached to each leaf,—varieties have one or more additional leaves; and to each is also fixed a triangular envelope, inclosing loose capsules and leaves for ready transfer to the microscope, and also a label indicating the name, habitat, and date of collection. A pink cover for each genus includes the species, and a stout millboard cover embraces the genera of each family, with the name of which it is labelled outside, the whole shutting up in a cabinet.

Another form is that seen in Rabenhorst's Bryotheca Europæa, quarto volumes of 50 specimens, one occupying each leaf, and so arranged that the specimens do not come opposite to each other. Others again use loose sheets of note-paper, within each of which a single specimen is mounted; but this, from their size, is very cumbersome. Or we may take a single well-chosen typical specimen and arrange many species on a page, as is seen in the beautiful volume of Gardiner's "British Mosses" or McIvor's "Hepaticæ Britannicæ." Whatever plan we adopt, our specimens, once well dried and kept in a dry place, are unchangeable, and are always looked upon with pleasure, each recalling some pleasing associations, or perchance reminding us of some long-lost friend, in companionship with whom they were collected or studied. A stock of duplicates must also be reserved, from which to supply our friends, or exchange with other collectors for desiderata in our own series: these may be kept in square cases of various sizes, cut so as to allow the edges of the top and sides to wrap over the other half folded down on the specimens.

The Hepaticæ of the family Jungermaniaceæ are treated precisely as mosses, the capsules, however, show but little diversity, and will not require separate preservation; but the elaters, or spiral threads accompanying the seeds, are elegant microscopic objects. The Marchantiaceæ must be pressed when fresh, as they do not revive with the same facility as other species, owing to their succulent nature and numerous layers of cells.

Classification.—On this I have fully treated elsewhere ("The Moss World," *Popular Science Review*, Oct., 1871), and it may suffice here simply to indicate the families of British mosses and their mode of arrangement. The cell-texture of the leaf takes an important place in the characters, and in accordance with this principle the Cleistocarpous or Phascoid group is broken up and distributed in various families. We have two orders; one indeed, comprising only the genus *Andreæa*, is distinguished by the capsule splitting into four valves united at apex; the other, including the bulk of the species, has in most cases a lid, which separates transversely, and usually discloses a peristome of tooth-like processes. The structure of these teeth again enables us to form three divisions. In the first they consist of a mass of confluent cells; in the second, of tongue-shaped processes, composed of agglutinated filaments; and in the third, of a double layer of cells, transversely articulated to each other, the outer layer composed of two rows of firm coloured cells, the inner of a single series of vesicular hyaline cells, on which the hygroscopic quality of the tooth depends.

Sub-Class SPHAGNINÆ.
Bog Mosses.
Fam. 1.—Sphagnaceæ.

Sub-Class BRYINÆ.
Frondose Mosses.
Order 1.—SCHISTOCARPI.
Fam. 1.—Andreæaceæ.
Order 2.—STEGOCARPI.
Div. 1.—Elasmodontes.
Fam. 2. Georgiaceæ.

Div. 2.—Nematodontes.

Fam. 3.—Buxbaumiaceæ.

Fam. 4.—Polytrichaceæ.

Div. 3.—Arthrodontes.

Subdiv. 1.—Acrocarpici.

*Distichophylla.

Fam. 5. Schistostegaceæ. | Fam. 6. Fissidentaceæ.

**Polystichophylla.

Fam. 7. Dicranaceæ.	Fam. 12. Splachnaceæ.
„ 8. Leucobryaceæ.	„ 13. Funariaceæ.
„ 9. Trichostomaceæ.	„ 14. Bryaceæ.
„ 10. Grimmiaceæ.	„ 15. Mniaceæ.
„ 11. Orthotrichaceæ.	„ 16. Bartramiaceæ.

Subdiv. 2.—Pleurocarpici.

Fam. 17. Hookeriaceæ.	Fam. 20. Leskeaceæ.
„ 18. Fontinalaceæ.	„ 21. Hypnaceæ.
„ 19. Neckeraceæ.	

Sub-Class HEPATICINÆ.

Liver Mosses.

Fam. 1. Jungermanniaceæ.	Fam. 3. Anthocerotaceæ.
„ 2. Marchantiaceæ.	„ 4. Ricciaceæ.

Among species which may be generally met with by beginners on the look-out for mosses, we may enumerate the following:—

On Walls.—Tortula muralis and revoluta, Bryum capillare and cæspiticium, Grimmia pulvinata, Weisia cirrhata.

In Clay Fields.—Phascum acaulon, Potiia truncatula and Starkeana.

On Waste Ground and Heaths.—Ceratodon purpureus, Funaria hygrometrica, Campylopus turfaceus, Bryum argenteum, nutans, and pallens, Pleuridium subulatum, Dicranella heteromalla and varia, Physcomitrium pyriforme, Pogonatum aloides, Polytrichum commune, piliferum, and juniperium, Tortula unguiculata and fallax, Bartramia pomiformis, Jungermannia bicuspidata, Lepidozia reptans, Ptilidium ciliare, Frullania tamarisci.

Shady Banks and Woods.—Catharinea undulata, Weisia viridula, Tortula subulata, Mnium hornum, Dicranum scoparium, Hypnum rutabulum, velutinum, cupressiforme, prælongum, purum, and molluscum, Plagiothecium denticulatum, Pleurozium splendens and Schreberi, Hylocomium squarrosum and triquetrum, Thuyidium tamariscinum, Fissidens bryoides, Plagiochila asplenioides, Jungermannia albicans, Lophocolea bidentata.

In Bogs.—Sphagnum cymbifolium and acutifolium, Gymnocybe palustris, Hypnum cuspidatum, stellatum, aduncum, and fluitans, Jungermannia inflata.

Rocks and by Streams.—Grimmia apocarpa, Tridontium pellucidum, Hypnum serpens, filicinum, commutatum, and palustre, Scapania nemorosa, Metzgeria furcata, Marchantia polymorpha, Pellia epiphylla, Fegatella conica.

On Trees.—Ulota crispa, Orthotrichum affine and diaphanum, Cryphæa heteromalla, Homalia trichomanoides, Hypnum sericeum Isothecium myurum, Frullania dilatata, Radula complanata, Madotheca, platyphylla.

Small as this list is, it will be found to yield ample store for investigation, and if true love for the study be thereby excited, the circle of forms will be found to widen with every new locality visited. If we have contributed in any way to facilitate the pursuit, then is our object fulfilled, and we may conclude with the words of Horace,—

> Vive, vale! si quid novisti rectius istis,
> Candidus imperti, si non, his utere mecum.

CANINE GYRATIONS.

NO one who has ever kept a dog or who has had opportunities of observing the habits of that most interesting animal, can have failed to remark the extraordinary and apparently unnecessary way in which a dog scrapes himself round and round in circles preparatory to settling down to rest; and it is undeniable that this habit is not confined to any particular class of dogs, but is observable in a greater or less degree throughout the entire canine race. Now, as this mode of procedure is certainly not produced, like some other fashions, by the requirements of modern civilization, but dates back from the most remote antiquity, several theories have been set up to account for it. The most notable of these is the Darwinian theory, which is briefly as follows. In the remote ages of the world the surface of the earth was for the most part covered with very long grass, in which the wild dogs used to wander about. When, therefore, they required to lie down, they were obliged to make several turnings in order to beat down the grass, and prevent suffocation, and dogs of the present day imitate their ancestors, although they have no longer any cause for doing so. It is difficult to see what the dogs could have procured as food, unless indeed, in those remote ages, they were graminivorous animals, or practised the horrid rites of cannibalism; and, judging from my own experience of walking in long grass, I should think that, once having attained a recumbent position, they would be slow to rise to the perpendicular again. But there are two facts which greatly invalidate this theory. In the first place, the prairies at the present day are occupied by the Wish-ton-wish, or Prairie-dog (*Spermophilus Ludovicianus*), to the entire exclusion of any species of our domestic dog. This little animal, which may perhaps be the progenitor of the canine genus, is a rodent, and burrows a subterranean habitation after the manner of the Mole, raising a mound, on which it sits in the daytime. Thus it certainly would not get into the habit of lying in the long grass. Moreover, this way of turning round is not peculiar to dogs, but is also shared by the less fortunate feline tribe. Dog-fanciers are apt to forget that there are other animals in existence besides their especial favourites, and, much-abused and little-noticed as they are, cats possess many qualities worth studying, and a great deal of instinctive cleverness which is not appreciated by the world at large. Of course there are cats and cats, and every one has not the same abilities; but it will be found that the excellences of the tabby race are most valued by men of a high order of intellect. But this is a digression.

Cats do not turn round quite so much as dogs, but they do, as a rule, make one or two gyrations before they finally roll themselves in a ball; and as cats are undoubtedly a climbing race, and not accustomed to sleep on the ground, and as most probably the same effect is owing to the same cause both in dogs and cats, we may reasonably infer that the Darwinian theory in this respect is incorrect. It has been affirmed that dogs always revolve three times; but this is a manifest absurdity, and palpably untrue. It appears, however, that they usually, if not always, turn in the contrary direction to the sun (*i. e.* from west to east), and this may be explained by the fact that in so doing they recline on their right sides, a practice almost universal among human beings, and by no means confined to people with weak hearts. Almost all shells have what is called a right-handed spiral, and vegetables will each only climb by one kind of spiral, the Hop one way, the Convolvulus the other. There would seem, therefore, to be some connection between the vegetable and animal worlds, in this matter, and I believe that pigeons and large birds, in ascending and descending, invariably describe the same helix. Can any other reader of SCIENCE-GOSSIP throw light on this most interesting subject?

Blackheath. E. C. LEFROY.

A GOSSIP ABOUT CANARIES.

OF all our "Feathered Friends" it would be difficult to find one more familiar, sociable, and cheerful than the Canary, becoming so remarkably tame, showing such pleasure in being noticed, setting itself up so sprightly, thoroughly entering into the kindness bestowed, and answering every word spoken to it. It will also show a great deal of affection for those in the habit of noticing it, calling loudly until something is said to it. I knew an instance where one would come from its cage at the ringing of a bell; upon which it was treated to a little sweet biscuit, hemp-seed, or maw-seed, as a reward for obedience. If time and care be given, the Canary may be trained to do almost anything, and with moderate care at moulting time a canary will live over ten years.

Some of our Yorkshire birds are very graceful, but not so strong or such good songsters as the Norwich birds. The song of the Canary, however poor, is composed of imitations of the best song-birds the world produces, *e.g.* the Nightingale, Woodlark, Skylark, and Titlark. Not only has it this delightful song, which in the above-mentioned birds lasts only two or three months (the Woodlark excepted), but it will sing its beautiful, changeable song almost the whole year round. In the Canary we get many shades of yellow, from the beautiful junk to the mealy or almost white, with a great variety of splashed birds, called by some persons "mule" Canaries. Add to this the fancy birds, such as the "Cinnamon," "Lizard" "London Pride" &c., and we get a pleasing variety not found in any other song-bird. Then, as a domestic pet for nesting and rearing its young, the Canary is, as a caged bird, without a rival. It will build its nest and bring up its young with almost as much felicity as a bird in the field; but to succeed, you should have a large cage for each pair, or, if a double cage, it should have a movable partition, so that when one hen is at nest the male bird may be shifted to the other hen. It is a common thing for canary hens to rear their young without the assistance of the male bird. If in an aviary, and you are not breeding fancy birds, you may let your birds loose without pairing, at the rate of one male to three hens; and for all purposes I would advise amateurs to try Norwich birds. In one season from a pair of such I reared twenty young ones; German birds, on the contrary, are almost certain to fail.

It will be found an excellent plan, in rearing canaries in an aviary, to tie some twigs of birch at the thick end, fastening them at the same time to a small piece of wood at the place where tied, so as to spread the birch in a semicircular form. The piece of wood should be about the same size as the nest-box. When this is done, place the diameter of the semicircle against the wall, and drive a nail through the part which is tied. You can then place your nest-box in the centre, and all is ready. When the young birds have left the nest, remove the whole, and it may be easily cleansed. This is presuming you have given them a corner of a room, just large enough to give them a small tree in the centre and a shallow pan to bathe in. Your birds should be put together about the beginning of March, at which time you must give them hard-boiled egg and crumbed bread. There is no occasion to chop the egg, merely take the shell off one end and give it to the birds in an egg-cup; there will then be a saving of time and less waste.

C. J. W. RUDD.

"NORTH, south, east, and west,—on all sides birds are to be found. Long before man appeared, they were settled inhabitants of this earthly sphere."—"*Bird Life,*" *by Dr. Brehm.*

THE BLIND FISHES OF THE KENTUCKY MAMMOTH CAVE.

WHATEVER value in itself the Darwinian theory of "Natural Selection" may possess, there can be no doubt that its promulgation has given a marvellous impetus to natural science. Many of the views taken in connection with it have enabled us to understand certain phenomena which before were inexplicable. Chief among these may be mentioned the doctrine of *retrogradation*. It is a mistake to suppose that the Darwinian theory countenances *progression* only—it endeavours, also, to explain degradation. Thus, on certain islands the beetles are wingless, although nearly allied to species in which the wings are well developed. This is explainable on the ground that on islands where the sea and land breezes blew strong, the beetles best gifted with powers of flight would be the first to suffer, would be carried seawards, and perish; whilst the weakest-winged beetles would stand the best chance of remaining behind, and of stocking such islands with beetles that would certainly inherit what would have been elsewhere a defect in their parents, but which thus turned out to be the means of the perpetuation of the race.

This law of retrogradation, operating whenever it is of advantage to the species operated upon, is, perhaps, still better illustrated by the occurrence in ancient caverns and subterranean rivers of animals wholly or partially *blind*, which are nevertheless closely related to neighbouring species in which the sight is in its normal condition. The fishes of the celebrated "Mammoth" cave in Kentucky have long been known to naturalists, and regarded as curious freaks, rather than as illustrative of the operation of an important natural law. The natural history of these fishes, and their relations to others of the piscine tribe which are found occupying similar habitats elsewhere, have been carefully and elaborately treated upon by Professor Putnam, in the *American Naturalist* for January last. As is well known, we have fishes existing, such as the Lancelet, in which not only the eye but the entire nervous system is in a very rudimentary or semi-developed condition. The "Cat-fish," family (*Siluridæ*) is interesting to naturalists on account of the singular and diversified arrangement and position of the eyes of its members, which are thus enabled to adapt themselves to a variety of physical conditions such as are not so largely shared by any other fishes. As regards the degree of optical development, also, the eyes of the various species are very peculiar. They range from partial and even total blindness to perfect sight; and are placed in every possible position about the head. The blind members of this group, however, seem to inhabit subterranean streams, one species, taken in the Conestoga river, Pennsylvania, having its eyes quite rudimentary. This species was believed to have found its way into the river from the subterranean streams which are known to empty themselves into it.

The most striking feature about the appearance of the blind fishes of the "Mammoth" cave is their want of colour. This alone would indicate the length of time during which they have existed out of the light; whilst the darker shades of blind fishes in other caverns equally point to a shorter period during which the species has been exiled into darkness. We mentioned in a zoological paragraph last month, the various animals inhabiting this remarkable cave, which were in a similar state of blindness; so that the limited subterranean fauna is very interesting, as showing the effects of conditions of life, not only on exterior form, but also on internal structure. The blind fish from this cave, longest known to naturalists, is *Amblyopsis spelæus* (fig. 35), a name which indicates both its defective vision and subterranean habitat. The eyes of this fish are quite rudimentary; but to make up for this defect the head is covered with a number of papillæ, or organs of touch, which the numerous fine nerves leading to them indicate must be of a very highly developed character. The nearest allies of the *Amblyopsis* are the Minnows. How well the sense of touch serves it is best shown by the fact that smaller fish, upon which it fed, have been found in its stomach. It is probable that the movement of its prey in the water influenced the delicate tactile organs so as to enable it to follow the prey

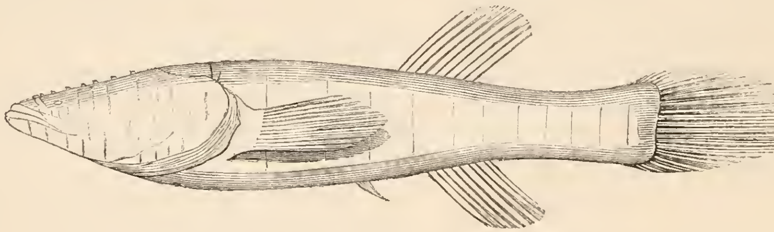


Fig. 35. *Amblyopsis spelæus*, nat. size.

rapidly. The habits of the *Amblyopsis* are solitary, and, notwithstanding its blindness, it is extremely difficult to be caught. At the slightest motion of the water it darts rapidly away, and then suddenly stops. They come to the surface to feed, where their tactile organs, being brought to the level of the water, can be of most service. At this time, says Professor Cope, they "swim in full sight, like white aquatic ghosts!" At any noise, down they sink to the bottom, to hide beneath the rocks or stones. The head is flat above, and thus enables the mouth to be at the surface. Hence the tactile organs and the mouth are placed in immediate *rapport*. The number of eggs laid by these fish is about one hundred; but there is every reason for believing they are hatched in the body; so that the fish is viviparous. Unfortunately, the condition of sight in the young—a very important fact in the history of the degradation of the eyesight of the species—has never been carefully examined. The length of the *Ambtyopsis* is about four and a half inches. So rudimentary are the eyes that they are only exposed after the removal of the skin. Their longest diameter is about the sixteenth of an inch. The optic nerves are placed in contact with the aborted eyes. Although mentioned as a characteristic fish of the "Mammoth" cave, the *Amblyopsis* is by no means confined to it, but has quite an extensive distribution, "probably existing in all the subterranean rivers that flow through the great limestone region, underlying the carboniferous rocks in the central portion of the United States."

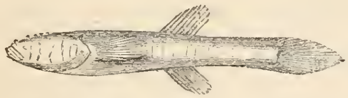


Fig. 36. *Typhlichthys subterraneus*, nat. size.

Another species found associated in the cave with the above is *Typhlichthys subterraneus* (fig. 36), whose name again illustrates its sightless condition. This fish is only about an inch and a half in length, and the next most peculiar character to its blindness is that it is without *ventral* fins. It has been found in natural wells as well as in the waters of this extensive cavern, in Kentucky, Alabama, and Tennessee. The fishes are all about the same size. All the females yet examined contained only about thirty eggs in their ovaries. The next remarkable genus of fish, greatly resembling the above, from the same geographical region, is *Chologaster*, of which there are two species,—*cornutus* and *Agassizii*. The former (fig. 37) was first found in the ditches of the South Carolina rice-fields. It is only about three inches in length, and is provided with eyes. Its specific name is given to it on account of the horn-like projections above the snout. It is believed to be a viviparous fish, but, like the *Typhlichthys*, has no ventral fins. Having eyes, it has none of the papillary ridges, or organs of touch, possessed by the blind species above named. It is further distinguished from its blind

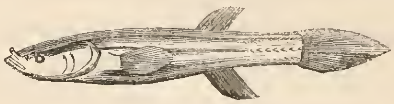


Fig. 37. *Chologaster cornutus*, nat. size.

neighbours by being *coloured*. Thus *Chologaster cornutus* is brownish-yellow, with dark, longitudinal bands; whilst *C. Agassizii* (fig. 38) is of a brownish colour, similar to many of the minnows. The latter species is known only to the subterranean district already mentioned, whilst the former extends to the southern coasts, on the eastern side the Appalachian chain.

Fig. 38. *Chologaster Agassizii*, nat. size.

It seems strange to find blind fish, with rudimentary eyes, living in the same subterranean waters with other species in which the eyesight is still preserved. That the former have had their eyesight atrophied, there can be little doubt, the position and arrangement of the optic nerves being sufficient proof. In many respects, however, the *Chologaster* is a transitionary form between the really blind fishes and those living naturally in open waters. The only explanation of the relations of these fish is, that *Amblyopsis* and *Typhlichthys* have been tenants of the subterranean district much longer than the *Chologaster*, and hence have been adapted to the circumstances more perfectly. How little is the value of eyesight to the *Chologaster* is indicated by the *Ambtyopsis* preying upon it! This theory of the longer habitancy of these cave-waters by the former genera is borne out by the fact of their white, colourless skin, free from ornament, whereas the *Chologaster* has both colour and stripes. Professor Putnam thinks that originally the district now occupied by these subterranean streams was a salt and brackish-water estuary, in which the progenitors of these fishes lived. As the waters became less brackish and more fresh, and the district was elevated, only such species would survive as could adapt themselves to the changes. Hence he believes the *Chologaster cornutus* living in the ditches of the South Carolina rice-fields to be now living "under very similar conditions to those under which others of the family may have lived in long preceding geological times." The Professor, it should be said, believes in the immutability of the species notwithstanding—a position which, we think, he hardly makes sufficiently clear to produce conviction. J. E. Taylor.

REMARKS ON POLYTHOA INVESTING THE GLASS-ROPE SPONGE.

By F. Kitton.

SINCE the publication of my paper on *Hyalonema* in the last number of Science-Gossip, I have had an opportunity of making further examination of the curious parasitic growth generally found upon the anchoring spicula ["the Glass-rope"]. I stated in my previous remarks that I had found, on the Rev. J. Crompton's specimens, the Polythoa investing

Fig. 39. *Polythoa* on *Hyalonema*.

the ribbon-like fronds of some species of algæ, and also that I found it growing on a small piece of some frondose alga that had become entangled on the Glass-rope. On making a microscopic examination, this proves to be a portion of the ova-case of a species of dog-fish. Fig. 39 represents the ova-case with investing Polythoa of the natural size; fig. 40, one of the tubercles enlarged about six diameters.

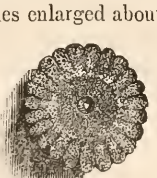


Fig. 40. *Polythoa* enlarged.

The examination of the Polythoa, when found apart from the sponge, has enabled me to ascertain the spicules peculiar to it, and to correct some of my previous statements. Figs. 24 and 25 appear to be the only forms of spicula really belonging to the Polythoa. My previous observation had been made on the forms obtained by boiling a portion of the rope and Polythoa in nitric acid. This of course not only separated the spicula imbedded in the coriaceous substance of the Polythoa, but also the various forms of spicula interwoven in the interstices of the Glass-rope.

The examination of the Polythoa after soaking in water for some days, revealed the presence of minute grains of sand, showing slight traces of arrangement: this is most conspicuous on the ridges of the tubercles. After the destruction of the animal matter by nitric acid, the siliceous remains consist of sand and spicula in about equal proportions.

A careful examination of this parasite in a living state, or a specimen preserved in spirit, is necessary for a complete elucidation of this very remarkable organism.

BEES IN THE HIMALÈH MOUNTAINS.

LITTLE is known relative to the domestication of bees in these mountains, even by those long resident on the spot, and much interest has of late been evinced in many quarters, notably by the late Mr. Woodbury, of Exeter, in an attempt to import and acclimatize the *Apis dorsata*, or wild bee, hereinafter alluded to, on account of its greater range of feeding and superior productiveness. I make, therefore, no apology for republishing the remarks of that careful and eminent traveller Moorcroft, as recorded in his "Ladakh, and Resources of the Hills," vol. i. cap. ii. page 51:—"The domestic bee is known by the name of *mahra, mohri,* and *mari;** it is not much above half the size of that of Europe, but is very industrious and mild-tempered.

"The wild bee† is termed *bhaonra*, a name by which the people of the plains designate the humble bee; but it is not half the bulk of that insect, though larger than the domestic bee of Europe. It is of a darker colour generally, and has larger and broader wings. Its temper is irascible, and sting venomous. It commonly builds its nest under projecting ledges of rock, overhanging steep mural precipices, in a situation almost inaccessible to bears and men. The hive [comb ?] contains a large quantity of both wax and honey. The latter, if gathered before the month of *Bhadra* (about August), is fully equal to that of the domestic bee; but in that and the following month it is said to produce intoxication followed by stupefaction. The effect is, with some probability, ascribed to the bees feeding on the flower of a species of *aconite*, which is in bloom in *Bhadra* and *Asarh* (September), and which, grow-

* *Apis nigrocincta*, or *Indica*.

† *Apis dorsata*.

ing high up in the mountains, is beyond the flight of the domestic bee."

All this I can confirm, having travelled in the parts of the hills where this wild bee abounds. It is also found in the plains, everywhere in the North-west Provinces, and has been described by me in a paper on "Indian Hymenoptera," in the Transactions of the Zoological Society of London, in June, 1869.

Here, however, the cells are seen depending in huge black masses on the lower sides of the larger boughs of forest-trees, and the natives are in general afraid to approach them.

They are so wicked that I fear they could never be domesticated, although the attempt was once made with very partial success by General Hearsay. Should the readers of Science-Gossip wish it, I will send the report of that experiment, cut out from the Exeter paper, for their amusement and information.

C. Horne, F.Z.S., late B. C. S.

Newcome, January 29, 1872.

CURIOUS HABITS OF SWALLOWS.

I HAVE imbibed many of the tastes of Gilbert White; but that which engrosses me most, and which I may call my hobby, is the natural history of the Swallow tribe. I have read that swallows will "mob" and put to flight a kestrel hawk. This I was rather sceptical of until lately, when my doubts were removed by that most convincing of proofs,—ocular demonstration. I had gone to see an old castle in the neighbourhood, which was built on the only hill for miles round, and was therefore tolerably certain to be the haunt of a pair or two of hawks. I accordingly kept my eyes open, in the expectation of seeing one, and I was soon rewarded by the appearance over the brow of the hill of a bird, which, by its graceful poise and the hovering motion of its wings, I knew to be a kestrel. His active little enemies, the swallows, a flock of whom were disporting themselves close by, had been as quick to see him as I. These at once advanced to meet the intruder, and, with the utmost audacity, brushed past him in all directions, one from one quarter and one from another, each wheeling after it had swept by and returning to the charge, while the hawk made futile dashes now and again, but was always too late to do any damage to his nimble little opponents. At last, tired of waging an unequal war, and obliged to own himself conquered, he beat a hasty retreat. He was not, however, allowed to get off so easily, but was followed up by his victorious foes; and the apparent mystery of such little birds proving more than a match for such a formidable-looking antagonist, armed literally *cap-à-pie* as he was, was quite cleared up; for as he made off, evidently at his best speed, the swallows, with the utmost ease, when left at an apparently hopeless distance behind, fetched him up, then passed him (in what appeared to me most dangerous proximity), wheeled round, met him on their return journey, and then, taking another sharp turn to the right-about, repassed him, and continued repeating these manœuvres a dozen times or more. The solution of the mystery lay in their extraordinary powers of flight. The way in which the swallows made straight for him, apparently bent on a personal encounter, and then, when the kestrel was reckoning on clutching them in his talons, gliding away at a tangent, was, though no doubt tantalizing to the hawk, none the less amusing and interesting to me. To crown all, when the others had left off the chase, presumably not thinking it worth their while to pursue any further, it was curious to watch one solitary individual carry it on alone with such seemingly unrelenting vigour that he seemed actuated by feelings of the direst revenge. However that might be, the swallow certainly effectually prevented the discomfited foe from pausing in his enforced retreat. I watched both until pursued and pursuer vanished from my sight. I dare say the little swallow continued the pursuit until he had wearied and exhausted the hawk. On another occasion I witnessed a little incident which has, to the best of my knowledge, the merit of novelty; and so I hope you will excuse my telling it. I saw a hare running across a large park by the wayside, and was looking about to see what had started it, but could not imagine what it could be, as neither man nor dog was in sight. It started again (for it had stopped and sat in a listening attitude), and then I saw that the disturbers were a flight of swallows, who were following it up like a pack of hounds; now one and now another skimming past the hare's ears along the ground, while the poor timid creature was putting its best foot foremost; but all to no purpose, for its relentless tormentors seemed to take pleasure in its fright, and to enjoy the sport of teasing it. I followed the little group until an undulation of the park hid it from my view, and was greatly surprised to see the dexterity with which the swallows calculated their distance so as to impress the hare with the idea they were flying straight at her, and yet, when they were on the point of dashing against her, took a sharp turn and swept off in a curve, to renew the attack again the next moment. I will close my epistle with an anecdote related by the Rev. Philip Skelton, as having come under his own observation, which seems to be appropriate, and which, I believe, will be new to most, if not all, the readers of this paper. I give it in his own words:—"I have entertained a great affection and some degree of esteem for swallows ever since I saw a remarkable instance of their sense and humour played off upon a cat which had, upon a very fine day, seated herself upon the top of a gate-post, as if in contemplation; when ten or a dozen swallows, knowing her to be an enemy, took it into their heads to tantalize her in a manner which showed a high degree not only of good sense but of humour. One of these birds, coming from behind her, flew close by her ear, and she made a snap at it with her paw, but it was too late. Another swallow, in five or six seconds, did the same, and she made the same unsuccessful attempt to catch it. This was followed by a third, and so on to the number just mentioned; and every one, as it passed, seemed to set up a laugh at the disappointed enemy, very like the laugh of a young child when tickled. The whole number, following one another at the distance of about three yards, formed a regular circle in the air, and played it off like a wheel, at her ear for near an hour, not seemingly at all alarmed at me, who stood within six or seven yards of the post. I enjoyed this sport as well as the pretty birds, till the cat, tired out with disappointment, quitted the gatepost, as much huffed, I believe, as I had been diverted." G. E. R.

NOTES ON THE WEB-WEAVING CATERPILLARS.

THE majority of insects producing cocoons and webs are found chiefly in the great group of Nocturni, formely called *Bombyces*, from the Greek *βομβυξ*, a *silkworm*. In the other divisions of moths, the pupa is genearally either subterranean or concealed in leaves spun together. Nearly all our butterflies belong to the Detegentes, or Exposers, with the exception of the Hesperidæ, which are placed under the Celantes, or Concealers. The pupæ of the Noctuas are generally subterranean, although in them also there are exceptions. In England there is but one butterfly constructing a web; this is the Black-veined White (*Aporia cratægi*), which, though here too scarce to do any damage, is on the Continent classed among noxious insects. It feeds on the Whitethorn, and appears on the wing in June and July. This species appears to be gradually becoming extinct, as it is now scarce where it was formerly abundant.

The commonest of the web-weavers is the larva of the Lackey-moth (*Bombyx neustria*), which may be seen on most hedges in the middle of June. It also attacks fruit-trees, and is often sufficiently common to be injurious. The most peculiar circumstance, however, concerning the Lackey is the manner in which the female deposits her eggs. The Rev. J. G. Wood, in "Homes without Hands," gives the following account of the manner in which she proceeds, and also of the origin of the name.

"When the mother insect lays her eggs, she deposits them on a small branch or twig, disposing them in a ring that completely encircles the twig, as a bracelet encircles a lady's wrist. When she has completed the circle, she covers the edge with a kind of varnish, which soon hardens, and forms a perfect defence from the rain. The varnish is so hard and binds the eggs so firmly together, that if the twig be carefully severed, the whole mass of eggs can be slipped off entire. As this varnish produces the same effect as lacquer does on polished metal, preserving the surface and defending it from rust, the insect is called the 'Lacquer,' a word that has been corrupted into 'Lackey.'" A caterpillar well known to gardeners is that of the little Ermine-moth (*Tinea padella*). The web of the larva seems designed to protect it from the attacks of birds, which seem unable to break through the tough outside case of the web. But although this may be a means of shelter from birds, it exposes them to a danger scarcely less formidable, inasmuch as, the web being very conspicuous, the larvæ may be destroyed in detail. It is fortunate that it is so, for as each web contains an immense number of inhabitants, were each larva to come to maturity, there would soon be scarcely a leaf left on our fruit and may-trees, which plants are the especial victims of its attacks.

An insect tolerably well known, but not quite so common as the two last, is the Gold-tail (*Leparis auriflua*). This moth has in its larval stage the power of "urtication," that is to say, it stings worse than nettles. The caterpillar itself is a very pretty insect, the colours being black and scarlet, mingled with white. It is found in June, feeding on the Blackthorn (*Prunus spinosa*). Another moth that occasionally swarms in some years, whilst in others it is hardly to be found, is the Brown-tail (*Leparis chrysorrhœa*). It is very nearly allied to the foregoing, the chief distinction being that the tuft at the end of the tail is brown instead of yellow. A web-spinner that must be well known to the readers of SCIENCE-GOSSIP is the small Eggar-moth (*Eriogaster lanestris*); but it has been so fully discussed in these pages, that there is no need to write more. The Kentish Glory (*Eudromis versicolor*) is another of our web-weavers: it was once, as its name imports, found in Kent. Its principal habitats are Rannoch Woods, near Perth, being very scarce in the county from which it takes its name. The reason why some larvæ should provide themselves with webs, whilst others content themselves with the shelter of the foliage, has never been satisfactorily explained. There is no perceptible difference in the organization of caterpillars, nor are the larvæ of the web-spinners apparently more delicate than those of other Lepidoptera. Nor is the use of the web itself very evident. In the case of the little Ermine-moth, it is evidently intended as a means of safety from birds; its utility in other cases is not so plain. The Lackey is one of those insects that are protected by some strange natural law from molestation by birds. The web cannot be needed in its case. Cannot some of the readers of SCIENCE-GOSSIP give us some ideas on the subject?

Notting Hill. C. LOVEKIN.

GRYLLUS VIRIDISSIMUS.

ON the evening of Monday, September 11th, I had a beautiful *Gryllus viridissimus* brought to me. It was found on some dry grass, just where a hedge had been recently cut down, and was in perfect condition, and very lively.

I had not any previous knowledge of the insect, but I imagined it must be a kind of locust, so I expected it to be a very voracious creature—a devourer of *any* green thing. I did not at the time remember that it had been noticed in SCIENCE-GOSSIP; and, as I had an engagement, I put it into a well-ventilated box with a glass lid, and, having supplied it with a quantity of fresh grass for food, left it to its fate for the day. On the Wednesday morning I could not discover that it had eaten any of the grass, and it appeared to have lost both bulk and vitality. However, I gave it a slice of apple, upon which it fed eagerly, making quite a little cavity by the action of its mandibles, and growing evidently stouter and more lively in consequence. I soon after took a walk to the spot where the insect had been found, and gathered a sprig of every plant which grew near, hoping in this way to ascertain its preferences. I arranged in a vase, dog-rose, hawthorn, dogwood, bramble, nettle, horehound, clover, &c., and placed them under a glass shade, which rested on a perforated stand, with a patch of fresh turf at the foot of the vase, and then transferred my *G. viridissimus* to its new quarters, with which it seemed very well pleased. It walked deliberately over all the flowers and sprays, but did not attempt to eat any, and it finally rested with great apparent contentment upon a rose-leaf. I supplied it with a fresh piece of apple, and then turned to my volumes of SCIENCE-GOSSIP for information. I was rewarded by finding a very interesting article, headed "The Large Green Grasshopper (*Acrida viridissima*)." The writer remarks that, notwithstanding these names, the insect is really neither a grasshopper nor a locust, but that it belongs to the Gryllidæ, or Cricket family; and in a little book, "The World of Insects," I find it is called *Gryllus viridissimus*. My specimen has all the distinguishing characters of the Gryllidæ: thighs of posterior legs large; tibiæ armed with spines; abdomen terminated by two slender fleshy appendages; tarsi of the anterior and intermediate pairs of legs three-jointed; antennæ long, and a long ovipositor.

I refer to this because the habits of my *viridissimus* differed somewhat from those described in SCIENCE-GOSSIP, and it might be thought that the insects were not the same.

Acting upon the information I gained, I supplied my *Gryllus* with cabbage-stalk, but it disregarded it, and preferred the apple. I gave it raw beef, cooked beef, flies, a caterpillar, a grasshopper, and a ladybird. All were touched both by its antennæ and its tarsi, but it did not attempt to devour any, though each remained some hours under the glass with it. The living things all came out unhurt, and the meat was not eaten. It still preferred the apple; but as I feared it did not eat enough for a creature of its size, I put in a large plum whole. This it immediately mounted, and made a cushion of for a considerable time, its bright green colour contrasting very prettily with the purple fruit, but it did not break the skin. For ten days it ate nothing that I gave it but the apple, and it looked well and was very active. I cannot help thinking that it gained part of its nourishment by gathering animalculæ both with its palpi and tarsi. The almost continual movements of the palpi, described by Mr. Ulyett as "cleaning its teeth," seemed to me to be the gathering in of its invisible food; and on examining the palpi with a lens, I found they were covered with delicate cilia, and this, I thought, gave additional probability to the idea. I fully agree with the opinion that the frequent application of the tarsi to its mouth was not for the purpose of making them glutinous, as it often put them there when it was walking about upon my hands, and I never felt them at all sticky; but I think it carried them to its mouth not only for the purpose of keeping them clean, but also to convey invisible food, for I have watched precisely the same motions when it has been resting upon a leaf, and not moving from place to place at all.

My *Gryllus viridissimus* was really a most elegant creature; its colours were just those of a young, vigorous autumn shoot of *Rosa canina*, which, with some other sprays, I placed within the glass. Over these sprays it travelled with evident satisfaction, sometimes leaping from side to side, sometimes clasping the stem, and at other times reposing head downwards upon one of the leaves. In its positions of perfect rest you could not readily distinguish it, its appearance was so leaf-like. Not only were its movements very fascinating, but it was so tame and friendly that it quite gained upon one's affections: it would leap about the table, and from the table to the carpet, always allowing itself to be recaptured on presenting it a finger; so that there was no danger of hurting it. I gave it some pieces of apple, cut very thin. It just lifted up the edge with two of its palpi, and then nibbled away; once it ate in my hand. But after ten days a change came over it. It would remain quiet for hours in some elegant, graceful position on a rose-spray, and then it would descend and appear restless; its ovipositor, from being horizontal, would become perpendicular, and it was evidently anxious to deposit some eggs; but, for some reason or other, it failed to do so. On these occasions it avoided the turf, moss, and mould, but it made many little holes in the muslin which covered the perforations of the stand; and once it pressed its ovipositor with some force on the palm of my hand, but it did not deposit eggs anywhere.

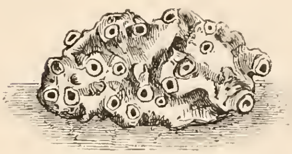
Just fourteen days after its capture the poor little thing died. Whether the cause of its death was its failing to deposit eggs, as it evidently had an inclination to do, or whether it did not get the food it preferred, I cannot tell. I should be very glad to know more of the habits of this interesting insect.

E. A. M.

MANNA OF THE DESERT.

AN EDIBLE LICHEN.

A VALUED correspondent, B. W., having sent me some notes on this production, which he hopes may prove of interest, and elicit further information from some of your readers, I beg to hand them to you, with some additions to the literature of the subject.



Figs. 41, 42. *Lichen esculentus* (barren and fertile specimens).

The discovery of this curious plant is due to Pallas, who named it *Lichen esculentus*, and described and figured it in his great work, "Reise durch Verschied. Provinzen des Russischen Reiches," tom. iii. p. 760, T. II. fig. 4 (1776). As this book is not accessible to the general reader, I give copies of the figures, which are of the natural size, and add a translation of his character. "Corpuscules free, oblong, composed of a convolute, thick coriaceous white crust, externally wrinkled and tuberculose, grey or pale ash-colour. Apothecia rare, immersed, excavated, somewhat prominent, like warts. Occurs thickly among stones in the very driest limestone hills of the Tartarian desert, scarcely distinguishable from small stones, except by the expert." In the modern system the plant belongs to the genus *Lecanora*, and will stand as *Lecanora esculenta*, Duf.; *Placodium Susufii* also being a synonym.

Mr. Berkeley tells us that Dr. Arthaud published a pamphlet to prove that this must have been the manna with which the Israelites were fed, and the same view is supported by Giles Munby, Esq., in a paper on the botanical productions of the kingdom of Algiers, read at Birmingham in 1849, before the British Association for the Advancement of Science, and published in *Annals of Nat. History* for Dec. 1849, p. 426.

Mr. Munby resided many years in Algeria, and he tells us that it covers the sand in some parts, and grows during the night like mushrooms, and also that the French soldiers during an expedition

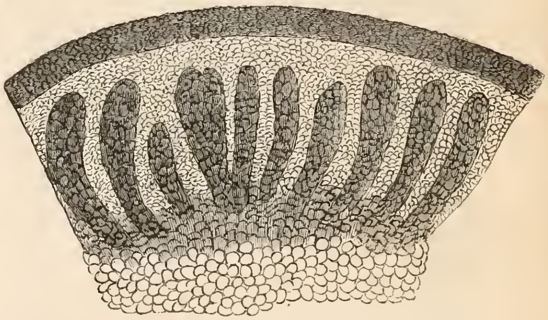


Fig. 43. Section of the margin of a lobule, from Algerian specimens, × 80.

south of Constantine, subsisted on it for some days cooking it in various ways and making it into bread.

The specimens received from B. W. were collected at Reboud Djelfa, in the desert south of the Great Atlas chain, and are not one-fifth the size of those figured by Pallas: in appearance they precisely reresemble gum ammoniacum, but are lighter, and and when soaked in water, of a corky consistence; their taste is slightly bitter, and internally they are of a starchy nature. A section under the microscope shows numerous gonidia imbedded in the thick cortical layer a little below the surface. It will thus be seen that the manna of the desert has nothing in common with the manna of our shops, a saccharine exudation from *Fraxinus ornus*, nor with the similar "manna of Mount Sinai" from the *Tamarix mannifera*.

Presuming that the lichen is the same as that or which the children of Israel were fed, there is really little inconsistent with the Scriptural account; allowing that the manna was miraculously supplied, it might still be brought about by natural agency, for Mr. Berkeley further mentions that, lying loose on the ground, without any attachment, it is easily rolled along by the wind, and sometimes piled together in strata several inches in thickness. Nay, more, it is still, occasionally rained from heaven, being carrid up by whirlwinds, and after traversing the air for many miles, falls precisely as the showers of fish, frogs, and gnats' larvæ, which afford sensational paragraphs for our own newspapers. Such a shower of these lichens fell about twenty years ago at Erzeroum, during a time of great scarcity; this bread from heaven affording opportune relief to the inhabitants. Probably, as Mr. Munby suggests, when gathered alive and placed in a heap, it would in such a climate soon ferment, and then "breed worms and stink;" the injunction to gather it daily might therefore have a sanitary import, and as a double quantity was collected on the day preceding the sabbath, little would be found on that day; but the Biblical narrative tells us, that which remained over on the sabbath "did not stink." The characters also of the manna do not accord in all points,—"as small as hoar frost on the ground—it was like coriander seed, white, and the taste like wafers made with honey."

Whether the manna of the wilderness was or was not a natural product is fully discussed in the Dictionary of the Bible (published by Murray in 1863, and the work of sixty-seven of the most eminent divines); from which it would appear to have been always considered an open question; the *Lichen esculentus*, Pallas, does not, however, seem to have been known to them, or it would no doubt have been noticed, and also the peculiarity that it may be gathered all the year round.

R. BRAITHWAITE.

VARIOUS FORMS OF POLLEN-GRAINS.

DURING a walk last summer through my fields, when getting over a wall, I was surprised to see my boots changed from black to a golden tinge; naturally I felt inquisitive to learn what this proceeded from. On examining them closer with my Coddington lens, I found that the beautiful yellow colour proceeded from an accumulation of the pollen of the various wild flowers which were then in bloom. I gathered about a dozen flowers of the different wild plants that grew around where I was standing. When evening came I amused myself by subjecting the pollen of them to an investigation under my microscope; it was amazing to see the numerous forms each tiny grain presented, and the beauteous symmetry of their varied markings. I was so pleased at the end of my research that I determined next day to get a fresh supply of the same flowers and sketch their uncommon pollen-grains. This I accordingly did, and now enclose sketches of the same, giving them their common as well as botanical names.

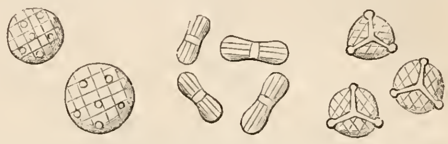


Fig. 44. Pollen of Bladder Campion, Broad-leaved Helleborine, and *Scabiosa arvensis*.

The objects were principally magnified with a half-inch objective, and some few of the larger ones with an inch power and A eyepiece. I feel sure these curiously-shaped pollen will be interesting to many

Fig. 45. Pollen of *Potamogeton densum*, *Sanguisorba officinalis*, and Eye-bright.

of your botanical readers. I think, however, as I am writing on this subject, it will not be out of place if I give a brief sketch of the function of the pollen of a flower, and the part it takes in the economy

Fig. 46. Pollen of *Cnicus lanceolatus*, *Jucundus conglomeratus*, and *Orobus tuberosus*.

of the plant creation. The pollen has the peculiar power of fructifying each seed which is growing in the ovary of the plant; the anthers contain the pollen-grains, and as soon as the flower comes into

Fig. 47. Pollen of *Hieracium subaudum*, *Erica ciliaris*, and *Mentha viridis*.

full bloom, the pistil, then fully developed, has on the surface of its stigma a viscid fluid, which makes the pollen adhere to it. When the anther has reached its zenith, the pollen falls off into a channel, which conveys it into the ovary underneath. There are many cells in the tiny pollen-grain, and a fluid called fovilla, which gives the creative power to the ovule. As soon as the pollen falls on the stigma it sends forth a tube, long or short, as the case may be; this descends through the style, enters the ovary, reaches the ovule, pouring in the fovilla, which gives life to the future plant, which it preserves and nourishes in the seed. The quantity of pollen in a plant is astonishing; but when it is recollected the numberless insects which feed on it, it can then be understood that an all-wise Creator has made provision for the different vicissitudes of the vegetable kingdom. In conclusion, my reason for selecting the pollen of wild flowers instead of cultivated ones, was, that there are many persons who have not access to flower-gardens, especially those who live in towns, and hence cannot investigate the subject for themselves; whereas, in the wide garden of nature, all can easily go into the green fields and gather the various flowers they care for, and by an examination of their varied pollen-grain, can gain both information and pleasure at a very small expense, granting, of course, that they possess a microscope of moderate magnifying power. The pollen-grains look charming when illuminated with a parabolic reflector, which throws them out in bold relief from the black background. Pollen-grains are very easily mounted by shaking the grains off on a piece of black paper and drying them carefully; then mount them in a shallow cell, on black paper, as an opaque object—the larger kind are the best for this purpose, such as the Mallow, Hollyhock, &c.; some of the darker-coloured pollen can very well be mounted in balsam. This operation requires to be carefully done, as the pollen, being soft, can be seriously injured by over-pressure. Having many of these specimens in my collection, I can well testify that they are highly interesting, even to those who have little interest in the subject, but still admire them, on account of their eccentricity of form. RALPH H. WESTROPP, A.B., T.C.D.

MICROSCOPY.

ARBORESCENT SLIDES.—If a few drops of the solution of nitrate of silver be placed in a clean copper cell cemented upon a glass slide, the growth of crystals of metallic silver will immediately start from the margin of the inclosed space and proceed with great regularity towards the centre. Crystals of the newly-formed compound, nitrate of copper, will be deposited upon the surface of the silver as the water evaporates, but by carefully immersing the slide in clean water these will be redissolved, and thus easily got rid of; when thus washed, the arborescent silver may be mounted either dry or in fluid, without in any way injuring or disturbing it, as will almost invariably be the case when it is precipitated upon a wire, as recommended by your correspondents in SCIENCE-GOSSIP, pp. 17 and 47. Slides of arborescent lead may be prepared in the same way from a solution of acetate of lead in a zinc cell (or by "F. K.'s" plan with a small shred of zinc). The similarity between the crystals of silver and lead has frequently been remarked, and it will be remembered that in nature these metals are constantly found in combination. Arborescent silver may also be prepared in great perfection by decomposing a solution of the nitrate by means of a weak galvanic current. The terminal wires in this case should be of platinum, and may be conveniently brought upon the stage of the microscope through two pieces of small glass tube mounted in the same way as the stage forceps: they both hold and insulate the wires and admit of movement in any required direction. A commutator—or contrivance for breaking or reversing the current—introduced between the platinum terminals and the battery will add very greatly to the interest of the experiment; a cell or trough containing the solution should then be placed upon the stage and the ends of the platinum wires immersed in it. On making the connection with the battery an exquisitely beautiful growth of silver fern-like crystals will immediately take place upon the wire connected with the positive plate, a simultaneous growth of prismatic crystals starting from the opposite wire. On breaking the current the growth will instantly cease, and on reversing it the curious effect of the disappearance of the crystals in the inverse order of their growth will be seen until all have been redissolved, when a fresh growth will immediately commence upon the opposite wires; and this alternate growth and *un*-growth may be repeated any number of times by a careful experimenter, to whom details as to illumination, magnifying power, &c., will be unnecessary here. It is, however, important to mention that only a *weak* current should be employed, as otherwise the process goes on too rapidly for convenient observation, and bubbles of gas are apt to be disengaged from the wires, which, in addition to disturbing the general tranquillity of the fluid, will be sure to detach the crystals themselves. A single cell of the smallest size "Leclanché" battery, or one of "Walker's" containing very diluted acid, will be found amply sufficient for the purpose. The foregoing experiment was detailed in the course of a paper read by the writer at one of the early meetings of the Quekett Club, but may yet be interesting to some readers of SCIENCE-GOSSIP, seeing that the subject has recently been revived in its pages.—*R. T. L.*

MALTWOOD'S FINDER.—This little instrument, so well known to microscopists, has perhaps not been so generally adopted as it deserves to be. This has arisen from two causes, the first being the somewhat cumbrous method of registration usually adopted, and, secondly, from difficulty of finding an object registered by different observers and "finders," arising from slight errors in the Finder itself, and also from the various methods of registration adopted by different observers. Mr. W. K. Bridgeman, president of the Norfolk and Norwich Microscopical Society, has suggested a plan which, by the aid of a very simple piece of apparatus, obviates, to a very considerable extent, the above-named objections to the Finder. He inserts in the eyepiece over the diaphragm an "indicator." This can be made in the following manner: Unscrew the top of the eyepiece, so as to expose the diaphragm; cut a piece of card to fit firmly over it; draw a line across the diameter of the disk of card, and cut an aperture in it of the same size as that in the diaphragm; cut a little notch in the ring in the same direction as the line, and gum a fine bristle in it, the point reaching nearly to the centre; when dry, place in the eyepiece (close to the diaphragm) and screw in the eye lens, and the indicator is ready for use. Finders are only necessary when the object is minute, or very rare on the slide, and the higher powers are used. One of the squares in Maltwood's finder usually fills the whole of the field of a $\frac{1}{4}$ objective; and if it so happened that an object always occupied the same position as a square, no great difficulty would be found in the registration of its position; but it more frequently occurs that portions of squares only are in the field; as for example,— $\begin{array}{c|c}1 & 2\\ 1 & 1\end{array}$ or $\frac{1}{2}$ or $\frac{1\mid 1}{1\mid 2}$. When this is the case, the indicator will be found of the greatest use. Bring the object to be registered close to the point of the bristle, remove the slide, and put the finder in its place, and note the exact position of the point. We will suppose that the figures are $\begin{array}{c|c}1\cdot & 2\\ 1 & 1\end{array}$, the dot representing the point of the indicator; the position of the object must then be registered thus: $\frac{1}{1\cdot}$, the dot always representing the exact position of the object when in the centre of the field. The rule for notation is that the square on which the pointer rests is that which must be written down. The error existing between two finders may be detected and remedied in the following manner: Place the finder on the stage, and bring the centre square into view, which would appear thus: $\boxed{\begin{array}{c}25\\ \cdot\\ 25\end{array}}$; remove it and put an ordinary glass slide in its place; make a small perforation in a gummed label; moisten it, and slip it on the slide, so that the aperture is central. The slide thus prepared can then be sent with the slides requiring examination; the second observer will then test his own finder by the slide, and the error, if any, noted. I have tried the plan proposed by Mr. Bridgeman, and find that it answers admirably. One or two slight improvements may perhaps be made—a ring of thin brass might be substituted for card, and a small brass pin soldered into it for the purpose of removing it from the eyepiece when required, and in place of the bristle, a piece of fine spun glass will be found preferable; indeed, so slight a portion of the field is occupied by it, that the indicator may always remain in the eyepiece, and will be found useful in calling another observer's attention to any object, or part of an object, that may be desired. The test slide may be made a more permanent record by marking the centre with a small ink-dot, and when dry, ruling (with a diamond) two lines at right angles to each other across the dot; the point of intersection will then be found in the centre of the field.—*F. Kitton.*

A New Goniometer Eyepiece.—Dr. Porter and Mr. J. P. Southworth have succeeded in making an eyepiece micrometer and goniometer, which they say, equal in cheapness and accuracy, and are much cheaper, than any yet seen. The objection to the eyepiece micrometer in use is the lack of boldness in the division lines, which makes them faint, and hurtful to the eyes. To overcome this objection, they have been led to make micrometers by the aid of photography, and have succeeded. The advantages of their goniometers over that ordinarily in use, is, that the angles of the crystal and the degrees of the goniometer are on the same line of sight within the tube of the microscope, while in the ordinary goniometer the degrees are marked outside the tube. The photographic processes by means of which this is achieved are not new, but may be learned in any work on that subject.

BOTANY.

Ranunculus Ficaria, L.—A common name for this species sometimes met with in our Floras is "Lesser Celandine." This is a deceptive and confusing name; it is really a corruption of *Chelidonium*, and the name of *celandine* should with propriety only be applied to *Chelidonium majus*. The true English name for this plant is *Pilewort*. Every one who observes the "little things of nature" must have noticed the peculiar whitening of the glossy golden petals after they have been fully expanded about fourteen days. Sometimes they appear with only white patches in different parts of the petals; at others, it commences at the tip, and runs half or two-thirds down the petals. Underneath the white patch appears as if the cellular matter was in a state of decay. The corolla is not marcescent, as in the *Campanulas* (Bellflowers). The term marcescent cannot be applied to a deciduous corolla, and without doubt the petals of the Pilewort are deciduous. I am not aware that any satisfactory reason has been assigned for this peculiar phenomenon, which does not exist only in this species, but may be seen in several buttercups. The changes going on in the petals of the Alkanet, Evening Primrose, &c., are different to the Pilewort. In the Evening Primrose the corolla does not suffer the loss of colour; it is only more intense, as from light yellow often to bright pink, or purple; on the contrary, the Alkanet changes from blue to pink. May not the following be assigned as one reason for this change?—at all events it is in harmony with first principles. At the season when the Pilewort begins to bloom, very few flowers are to be met with. The brilliant petals may then be designed to attract the honey-bee, so as to bring about more effectually the fertilization of the ovules: this being a accomplished, the corolla begins at once to exhibit the white blotches. After the whitened and withered-looking petals appear, the bee never visits the flower. I speak now from my own limited observation, which may not be in strict accordance with the observations of other botanists. The carpels are but loosely placed on the receptacle, and are easily displaced. If they fall before they are fully matured, of course germination cannot take place: thus the speckled petals may be produced solely to repel bees and other insects. The petals vary much, both in number and size: this may depend to a great extent on the richness or fertility of the soil in which they are growing. The *R. ficaria* of Linnæus is now divided into two very distinct varieties, recognized chiefly by the variation in the leaf (*see* Syme's "English Botany"). The botanical reader will do well to keep a look-out this spring, as their distribution does not seem to be well ascertained. The one named *R. divergens*, F. Schultz, appears the most frequent; whereas, so far as I am informed, the *R. incumbens* is rare in our northern counties.—*James F. Robinson.*

Abnormal Ericas.—Mr. Britten draws attention, in the *Journal of Botany*, to an anandrous variety of *Erica cinerea*, from Wiltshire, which has year after year brought forth similar blossoms. Their appearance is very remarkable, and due to the fact that both corolla and stamens were wanting. The specimens are interesting on account of their apparent permanence.

Hymenophyllum Tunbridgense.—I beg to say that I know a locality for this fern not far from Llanberis. It grows, in company with *H. Wilsoni*, in a somewhat dangerous place, but was procured for me by a native about eighteen months ago.—*R. M. Middleton.*

Belfast Naturalists' Field Club.—The eighth annual report of this flourishing club has just been issued. Among other interesting material there are given several localities for some of the more interesting plants of the district; among others,—*Carex strigosa*, *C. districha*, *Arenaria trinervis*, *Tortula recurviflora*, *Orthotrichum leiocarpum*, and many others, some of which have not been before recorded.

The Flora of Berkshire.—Mr. James Britten, of the British Museum, has just published what he modestly terms "Contributions" to the flora of the above county, but which is a most valuable summary of the botanical knowledge of that part of England. It takes the form of a list, showing how much is known, and how much more remains to be known, of the distribution of the species found within its limits. Altogether the enumeration of the species may be looked upon as a record of the plants known to exist in Berkshire in, or previously to, 1871. The county has been divided into five districts, for the purposes of floral distribution. The authorities quoted, from old Gerarde downwards, are very numerous, and Mr. Britten may be congratulated for having successfully accomplished a very difficult and onerous task. The list contains no fewer than 844 species.

Mosses of the London District.—Mr. T. Howse asks in the January number of Science-Gossip for habitats of mosses near London. The following list contains some that I found while residing in London five or six years ago. In communicating them, I must express the hope that the rapacity of collectors will not exterminate those that the inevitable encroachments of bricks and mortar have hitherto spared. I would reccommend collectors to explore Hampstead Heath well, especially a bog in the farther part; also the banks and walls bordering the road from Hampstead to Highgate. A walk from Mill Hill through the lanes by Shenley to St. Albans also yielded me many species. Another good day's walk was from Barnes Common (where many rare plants are to be found) up the lane leading to Roehampton; thence across Wimbledon Common to Combe Wood: *Sphagnum acutifolium*, Hampstead Heath; *S. cymbifolium*, Wimbledon; *S. squarrosum*, Walthamstow; *Phascum subulatum*, Stanmore Heath; *Weissia controversa*, banks of road from Hampstead to Highgate; *W. cirrhata*, on old paling in lane from Barnes Common to Roehampton; *Dicranum scoparium*, Hampstead; *D. heteromallum*, Clapham Common; *Pottia truncata*, Old Oak Common; *Didymodon rubellus*, Highgate; *Tortula muralis*, Kilburn; *T. subulata*, Elstree; *Atrichum undulatum*, Combe Wood, Shenley; *Pogonatum nanum*, Hampstead Heath; *Polytrichum commune*, Barnes and Wimbledon Commons; *P. juniperinum*, Barnes Common; *Aulacomnium palustre*, Hampstead and Roehampton; *A. androgynum*, Barnes and St. Albans; *Bryum nutans*, Wimbledon Common; *B. capillare*, Mitcham; *B. argenteum*, Kilburn; *Mnium hornum*, Highgate; *Funaria hygro-*

metrica, Paddington goods-station; *Fissidens bryoides*, Hampstead, near Finchley Road; *F. taxifolius*, Colney Street; *Hypnum confertum*, St. Albans; *H. rutabulum*, Kensal Green and Highgate; *H. prælongum*, Hampstead; *H. striatum*, *H. tamariscinum*, *H. splendens*, Shenley; *H. cuspidatum*, Roehampton; *H. fluitans*, Kensal Green and Hampstead; *H. compressiforme*, St. Albans; *H. denticulatum*, Highgate; *Scapania undulata*, Hampstead; *Jungermannia inflata*, Wimbledon; *Lophocolea bidentata*, Shenley.—*H. Franklin Parsons, M.D.*

ZOOLOGY.

The Crystal Palace Aquarium.—A capital guide-book to the Crystal Palace Aquarium has just appeared, written by Mr. W. A. Lloyd, the superintendent of the aquarium. The great interest in natural history which this beautifully-fitted-up aquarium has already elicited will be intelligently ministered to by this little handbook. It contains a brief history of aquarium-building, and a detailed explanation of the principles upon which that at the Crystal Palace is constructed. Then follows the natural history of the various animals living in the several tanks, with such original notes of their habits, &c., as have been studied since they were placed in their new house.

The Great Auk.—Dr. Hayes, in his work on Arctic travel, just published, records a visit to Greenland, and, speaking of Mr. Hansen, a naturalist there, says:—"To the study of the birds of the region and their habits he has devoted much attention. The Great Auk, long since supposed to be extinct, he told us had recently been seen on one of the Whale-fish islands. Two years before one had actually been captured by a native, who, being hungry, and wholly ignorant of the great value of the prize he had secured, proceeded at once to eat it, much to the disgust of Mr. Hansen, who did not learn of it until too late to come to the rescue. Mr. Hansen was at this time Governor of Godhavn, Disco Island, and had previously been Governor of Proven and Upernavik."

Musical Mice.—As this subject has been discussed in our columns lately, it will not be out of place to draw attention to an article in the *American Naturalist*, in which Dr. Lockwood gives a description of a singing vesper-mouse (*Hesperomys*). The mouse in question was brought from Florida, and, at first, the twitterings were ascribed to swallows. One day the mouse came on the hearth, sat up, and sung for a minute or so, and then retired. Eventually it fell into Dr. Lockwood's hands, so that he could minutely study its habits. It was at night that its song usually began, and so distinct were its notes that Dr. Lockwood had them written down, and they are given in the article to which we are now referring. The notation in some parts much resembles that of the nightingale, only that it is in a different key. The scope of the notes was remarkable, falling an octave with all the precision possible. The mouse would burst into song, like a bird, all on a sudden. One song, named and written down by Dr. Lockwood as the "Grand Rôle," was singular for its strange diversity of changes. So soft and silvery were the notes, that the author remarks that if they had been uttered by a canary the bird would have been worth a hundred dollars! This singing would sometimes last as long as nine minutes. The doctor is utterly opposed to the idea that this singing was due to bronchial disease, and gives undoubted reasons for his belief; amongst others, that most of the notes uttered were those it would have been most impossible to have sounded under any form of bronchial affection.

Pike-fishing in Norfolk.—Norfolk is the Paradise of the Pike. We may read in the newspapers of his growing to an enormous size in some solitary fishpond, where, for aught we know, he may have reigned supreme since the days when the pre-Elizabethan monks placed him there as a young pikerel. But nowhere does the average size of pike equal their condition in the Norfolk rivers and broads. There you find them in all ages and sizes—from the three-inch jack just trying his "prentis han'" on equally juvenile roach and dace, to the still growing, elderly individuals over three feet long. Their number is legion; and Norfolk pike-fishing, in my estimation, beats both trout- and salmon-fishing for right-down good sport. If you are inclined to be sentimental, and to subscribe to Mr. Freeman's views about hunting, you have the satisfaction of knowing, when pike-fishing, that you have not lured poor herbivorous creatures to their destruction, but simply caught the carnivorous cannibal that intended to do unto others what you intend to do to him!—*J. E. Taylor, in "Belgravia."*

The Butterflies of the Channel Isles.—As these islands are a very favourite resort of tourists and naturalists during the summer months, it may not be uninteresting to the readers of Science-Gossip to hear what my experience has been, and I am the more induced to send these notes for insertion in your excellent Magazine because it was not until the end of a long stay in Jersey that I caught anything worth mentioning. In this island it is only the south-east district which contains rare Lepidoptera. Between the hills and the sea I found *C. edusa* in profusion; *C. hyale* came flitting by now and then, and the rare *P. daplidice* was not uncommon at midday. In the lucern-fields I found *A. lathonia*; but this latter insect was very hard to catch. The specimens of *C. edusa* which I caught showed a decided richness and depth of colour which the English specimens do not possess. In fact, on comparing them with their Indian brethren, there was scarcely any difference distinguishable; and this is somewhat remarkable, considering that the difference between the summer heat of Jersey and England is very slight. In *C. hyale* and *P. daplidice* I did not perceive any difference, but *A. lathonia* was, like *edusa*, much darker, and the silver markings underneath were brighter. Throughout the island painted ladies (*V. cardui*) took the place of whites, and exhibited much variety of colouring, from brown to rose-colour. If I had netted all the whites I saw, I should, no doubt, have taken more specimens of *daplidice*, for it is impossible to distinguish between the species while on the wing. This is, no doubt, a wise provision of Providence, to prevent their complete extermination. I have read with pleasure the paragraphs which have lately appeared in SCIENCE-GOSSIP, showing that butterflies settle on objects of a similar colour to themselves, and I can quite endorse the opinions of my friend Mr. E. C. Lefroy on this point. In Guernsey, for instance, the oak-eggars, which are very common, invariably fly down the shady lanes, and settle on the trunks of trees and other dark surfaces. It is very evident that butterflies have no eye for a pretty landscape, or, otherwise, we should have more of them in Guernsey, which, small as it is, presents a greater variety of picturesque scenery than the larger island. At any rate, I have nothing uncommon to put down in my list, as, during the whole of my stay, I saw nothing worth catching, if I except a few solitary specimens of *S. semele* which I occasionally met with. This butterfly may have been more common in some parts, for it is very local in its habits, and often confines itself to a single field, where it may be found in swarms. It is also very partial to hill-sides. I took a good many specimens of the Oak-eggar and Jersey Tiger, and one Brimstone butterfly (*G. rhamni*), the only one I saw in the islands. Several species of diurnal moths were common in Guernsey and in Sark, which is about six miles distant. *S. semele* was in great profusion. As we had sailed out for a picnic, and I did not expect to find any insects on so small an island, I did not take my net, but I managed to knock down and capture five or six graylings with my hat. I found them to be exceptionally large and fine. I was told that the green Hair-streak (*T. rubi*) was very common in the Jersey clover-fields; but though I was there during the greater part of August, I did not observe a single specimen. Fritillaries (except *lathonia*) and skippers were as scarce as hair-streaks; but I caught *Alexis*, *Argiolus*, *Œgon*, and *Agestis;* also the commoner *Vanessas* and browns.—*W. H. Booth, Blackheath, S.E.*

BIRDS IN WINTER.—It may not be unacceptable to some among the readers of SCIENCE-GOSSIP to hear how we are able to watch some of the habits of a few species of birds close by our drawing-room window. For this purpose there is erected about three yards from the window a tripod, originally used as support for an archery target, and to the top of this an earthenware pan is suspended by three strings; this is kept full of hemp-seed, and there is a continual flow of birds to it. The most frequent are the tits, of whom we constantly see four species; viz. the Great, Blue, Cole, and Marsh tits. When no one is watching them, the sparrows will come in great numbers; but they will not be watched nearly so freely as the tits allow themselves to be. Occasionally the most amusing scenes take place before our eyes; sometimes a blue tit will deliberately attack a great tit, and sometimes drive him away. If the great tit resists at all, he is usually "one too many" for his diminutive cousin, but usually they are a little afraid of one another, as there are seldom more than one, or at most two, birds in the pan at once, though there are often others on the edge, or on the three legs of the tripod. I have now spoken mostly of the tits, but we have other visitors which, though not so common, are perhaps quite as pretty. These I have not space to describe. I must, however, narrate an exciting event which took place last August. A greenfinch had taken possession of the hemp seeds, and entirely forbade any other birds to come near, except our friends the tits. If a sparrow settled on the edge of the pan, he flew at him at once and drove him away. Occasionally four or five sparrows would come one after another; and on such occasions his time was entirely occupied with these; and so his dinner had to wait till they were all gone. But his conduct towards the tits was very different; he seemed to appreciate their strength and pluck, and never attempted to interfere with them. This respectful conduct, however, entirely vanished when some other bird arrived. We have lately had another friend come for food in the shape of a nuthatch, or, rather, a pair of nuthatches, which originally came for nuts, put out for a squirrel's benefit; but we managed to tempt them nearer and nearer to the house till they were tame enough to be closely looked at through the window. At one time I counted fourteen visits from these two in the space of half an hour, and each time a nut was carried away. I am told their visits were continued after I was obliged to leave my position. These nuthatches do not often visit the tripod; but at a house I know near Cromer, where the birds are fed in the same way, they frequently associate with the tits and eat the hemp-seed. At these times, when prevented from going straight to the pan by a tit or other bird, they will run up and down the supports, always running head downwards when descending, and never content to fly down from the top to the pan; they always fly away with the seed, and do not crack it on the legs of the tripod or the strings supporting the pan, as the blue tits always do.—*A. F. Buxton.*

GEOLOGY.

Fossil Hydrozoa.—The hydrozoa are the rarest group of organisms which have yet been met with, as, with the exception of the doubtful *Oldhamia*, the well-known characteristic fossil of the Cambrian rocks, only the impression of a *Medusa* has been discovered in the Solenhofen stone. To these Mr. James Thomson, F.G.S., of Glasgow, has added a new genus and two new species, from the carboniferous shales of the West of Scotland. The generic name of *Palæocoryne* has been given to the former, and *Scoticum* and *radiatum* to the latter. The nearest related group is the anomalous *Bimeria*.

Carboniferous Reptiles. — Professor Cope has recently given a detailed account of the carboniferous reptiles of Ohio, U. S. They are referable to ten genera, and include twenty-seven species. These reptiles are of the most interesting character, on account of their forming so many "missing links." Most of them are batrachians, but one (*Molgophis*) resembles the serpents, with certain peculiarities of structure.

The Latest Changes in the Northern Hemisphere. — It was after the emergence of Europe from the glacial sea that floral migrations began more particularly to spread over her. The climate was still rigorous in its character, the snow-line coming down in the winter probably to near the sea-level, as it now does in Greenland. Over the available area, arctic plants spread themselves, finding luxuriant habitats in the newly-formed subsoils of the "Drift." The hairy mammoth, woolly-haired rhinoceros, the Irish elk, musk ox, reindeer, glutton, lemming, &c., more or less accompanied this flora, and their remains are always found in the great glacial deposits of Europe as low down as the South of France. In the New World, beds of the same age contain similar remains, indicating that they came from a *common northern centre*, and were spread over both continents alike. When the animals and plants of the Arctic and sub-Arctic regions of the Old and New worlds are compared, one cannot but be surprised at their identity. All, or nearly all, belong to the same genera, whilst many of the species even are common to the two great continents. This is most important in its bearing on our theory, as indicating that they radiated from a common centre *after* the Glacial period. When we explore the temperate regions of the same countries, we find the floral and faunal differences increasing, as one would expect in remembering that many of the species date from the Miocene epoch. In equatorial latitudes this contrast reaches its climax. No other theory will explain this peculiarity than that Arctic and sub-Arctic species have spread *since* the Glacial epoch, whereas the southern and equatorial forms are *older* geographically, and were driven to their present areas of occupation by the slowly but surely advancing cold of the period in question.—*J. E. Taylor, on the "Geographical Distribution of Animals and Plants," in "Westminster Review."*

Flint Flakes. — I had no opportunity of reading Mr. Whitley's letter on Flint Flakes in your number for August last till the close of the year. I can fully confirm Mr. Whitley's statements respecting the flint flakes from his "crusher," of which I have several, not to be distinguished *in form* from what are considered to be typical prehistoric specimens; but these crushed flakes are wanting in one particular, viz., the patina, or white crust, the effect of long exposure to atmospheric influence; and it is by these qualities of form and colour that "we learn to distinguish between false and true weapons." I feel pretty sure I am not wrong in ascribing great importance to the "patina" as a test of the authenticity of flint flakes, for in and around Paris they are, almost without an exception, found only on a level with the river in all the gravel-pits with which Paris abounds. There, and there only, are they met with; and this is so universally the case, that although I have searched almost every gravel-pit that was open last year round Paris and St. Germains, I only met with one flake at a higher level, and M. de Mortillet pointed to a rust-stain on its surface in proof that it had come from the surface gravel, and had been struck by the spade or some iron tool. Now this level is exactly that where the bones of extinct animals are found, and corresponds with the levels at Amiens and Abbeville, at which flint flakes have been found mingled with the bones of the same animals, and even with those of man; yet neither Amiens nor Abbeville is on the Seine. In the South of France also human bones, as well as flint flakes, have been met with at the same levels in river gravel. Neolithic or worked flints have almost as invariably been found at a higher level; and the patina, when it exists is not so thick as on the flakes. M. de Mortillet assures me that flint flakes taken from peat bogs, bottoms of rivers, and other places to which air has no access, have no patina. The downs here are covered with millions of flints, both whole and broken, yet in ten minutes I found more characteristically-shaped flakes from Mr. Whitley's crusher than I could find in ten hours upon the downs. And why? Because nature splits them by frost and heat, which do not give them regular edges and facets, while the crusher acts as primeval man did, and splits them by force applied *ab extra*, the effect of which is the same, whether it be a crushing power or a blow from another flint, man's sole weapon at that period.—*T. Ogin Ward, M.D., Oxon.*

NOTES AND QUERIES.

Glowworms.—In my rambles last summer I frequently came upon those beautiful objects, glowworms. I have caught them and put them on the grass near the house, but very seldom saw anything of them after a night or two. I had a fancy to try and keep some through the winter, so I procured a white pot, bored a hole in the bottom for ventilation, and a glass shade with a small hole in the top, such as night lights are burnt under. After partly filling the pot with earth and moss, I cemented the glass to the pot with plaster of Paris, then got a small brass ring, a little larger than the hole at the top, and had some muslin tacked over it to form the cap, to prevent them getting out, then my cage was complete. I enclose a rough sketch, as I find it very useful to keep eggs in, &c. I next supplied the case with worms as food, but they did

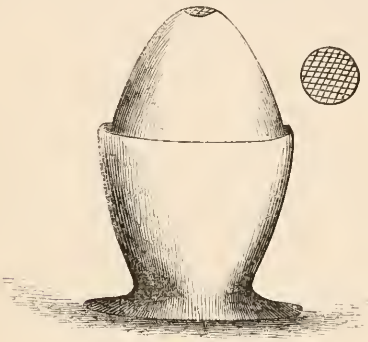


Fig. 48. Glowworm Cage.

not seem very fond of them as diet, as I frequently saw worms lying on the moss close to my friends without molestation, and most of them are now alive, and come to the surface occasionally. After I have watered the earth, which I do to purify them, they will eat a dead worm if hungry. Slugs seem their favourite food. Directly one is put into the case they all seem alert, and as it passes, first one and then another gives it a gentle reminder; and to judge from its actions, I should fancy it has a great objection to the bite, which generally kills it in an hour or so. In consequence of the dry season, I was unable to obtain any subject until the latter part of August, and am afraid I had not many eggs. I only saw about half a dozen on the moss. I kept the case indoors, and the last time I saw them glow was on December 1st. After sprinkling them with water until the 4th of February, when they seemed rather unhealthy, I put them out of doors, the night being warm and rather damp, and I saw one glowing. I have a great wish to catch a male, and should feel obliged if any friend can inform me how I can manage it, and also where I can obtain information about them, as none of our libraries in this neighbourhood seem to have it, and in return I will try to procure specimens for any reader who may wish to try to keep them in ferneries or elsewhere.—*T. Buck, Chelmsford.*

The Unicorn.—In answer to "Query" in the February number of Science-Gossip, I beg to state that from Astle's "Seals of the Kings, &c., of Scotland," in which the signet of Margaret, queen of James III., figured at page 4, is engraved, we learn that the unicorn was one of the royal badges of King James III., who struck gold coins called "unicorns" and "half-unicorns." In Boutell's "English Heraldry" we read (page 274) that two silver unicorns, "royally gorged and chained *or*," were assumed as supporters by James IV., and retained in use. At the union of the two kingdoms under Jamds I. and VI., the lion of England and the unicorn of Scotland were adopted, and with the exception of Protector Cromwell, who used the lion of England and the red dragon of Wales on his broad seal and privy seal, they have so continued to the present day. So much for the history of the use of this elegant though apocryphal beast. Whether Margaret adopted it as her husband's badge, or James used it in compliment to his wife, may be left an open question; but I think that the ornamental addition of the crown and chain may be considered to represent the fierce and dangerous animal after his subjugation by the force of female purity and loveliness. —*T. G. Bayfield.*

Alauda arborea.—I do not wish to be too critical, but may I ask your pleasant correspondent "Mr. Joseph Drew, of Nansladron." which, of two very different—and by me long confounded—birds he means by the "Tree Pipit"? The Tree Pipit's book-name is *Anthus arboreus*, and it is, it seems, the *Alauda trivialis* of Pennant and Montagu. The true Tree Lark, becoming, alas! scarce in Hampshire, is *Alauda arborea*, of a different subgenus, being a true lark. If killed—which heaven forbid any man should do by them, the two birds may be distinguished thus roughly:—The Tree Pipit has the longer bill and short hind claw of the *Anthus*, and a spotted stomach; the Tree Lark has the shorter bill and long hind claw of the *Alauda*, and a stomach without spots. It is also a thicker and less grey-coloured bird. The habits of the two, when singing on the wing, are so alike as to have puzzled me often. The distinction which I should make is, that the Tree Pipit, in hovering, spreads its tail like a fan, and curves its wings downward, which I have not seen the Tree Lark do. The Tree Lark certainly sings at night, as described by Mr. Drew, and its song is one of the most exquisite and flute-like I know, far surpassing that of the Tree Pipit. But when Mr. Drew speaks of being unable to distinguish his bird (after singing ceases) from the titlarks, I am doubtful which of the two birds he means.—*C. Kingsley.*

Abnormal Tulip Stamens.—The transition betwixt petals and stamens, or stamens and petals, in the white Water-lily (*Nymphæa alba*) is well known to botanists. In this case it is only a normal state of the flower; but in the following case of the single Duc Van Tholl tulip the transition going on was abnormal. Upon looking over a bed of garden tulips last June, I observed several flowers with the stamens in an abnormal state; some of the stamens were similar to those observed in the Water-lily, with the anthers elevated, apparently on one of the petals, or, to make it more plain, the filament was changed to a petal. In the other case the anther, instead of being placed at the summit of the transformed filament, was growing out of its side. In both cases the transformed filament was coloured the same as the normal petals. The above is only one of the many illustrations of the rule long ago advocated by Lindley, that all the parts of the floral whorl are transformed leaves.—*James F. Robinson.*

The Gipsy-moth (*Liparis dispar*), p. 23.—Having had considerable experience in the rearing of this interesting species, I beg to offer a few remarks on that insect to your correspondent, Mr. John Henderson. My experience with regard to size coincides with that of Mr. Henderson, and I have never reared a specimen approaching that figured in Mr. Newman's work. I find they vary considerably in size, more especially the mules: I have one or two in my collection not larger than a fair-sized specimen of *R. cratægata*. On turning back to a previous volume of Science-Gossip, I find a note by Mr. Clifford on the above species: he writes, "As far as I know, all those reared by us produce what is called the northern, or dwarf type, which has been bred 'in and in' for some years past by collectors; nor could the diminutive form be brought up to the full size again by any mode of treatment." I know of no entomologist who has obtained larger specimens than myself or Mr. Hederson. Further on Mr. Clifford writes: "On one occasion I liberated, by way of experiment, a largish number of these caterpillars near London, placing them on sallow, which seems most congenial to their taste; however, subsequently, I was unable discover either cocoons or moths." Any information with regard to the above subject in these pages would be very acceptable to me as well as to Mr. Henderson.—*R. Laddiman.*

Cleaning Sand Foraminifera.—I have obtained some sea-sand which contains *Foraminifera*, and have tried several plans for washing out this lime which they contained, but have not yet succeeded. I have tried the following plans;—1. Washing them with a drop of muriatic acid in a watch-glass half filled with distilled water; but I found that evaporated them altogether; so I put in more water, and then it had no effect at all. 2. I have fully adopted that plan described in Science-Gossip for September, 1870, by Mr. "J. H." by boiling them a quarter of an hour in liquor potassæ, and afterwards a quarter of an hour in water; but when I mount in Canada balsam, I find perhaps one half of a shell clean, and the rest all full of dirt. I have also tried them by boiling in soda and water, but cannot succeed. If any reader will kindly inform me where my error is, and of any other plan, I shall feel obliged.—*L. H.*

The "Liver."—In last month's number of Science-Gossip there are two notices from correspondents, about Liverpool, and the origin of its name. We all know that there never was such a bird as the "Liver," but very few seem to have any idea as to what the name really means, or whence it is derived. It appears to me that we must seek it in the old language of the country. We know that in ancient times the "old British" was spoken in the district, which in these days is represented by the Gaelic and the Welsh. Now we find in the Gaelic a word which is sometimes spelled "Leththir," or "Lethir," or "Leithtir," which means the "side of a country," or "near to the sea;" and in the Welsh "pwl" means a "pool." Putting the two words together we have "Leththirpwl," or "Lethirpwl," or "Liverpool," a "pool near the sea." The above explanation of the meaning and origin of the name is to some extent confirmed by the fact that the old inhabitants of the country in the neighbourhood call the place "Litherpul," or "Lirpul," to this day. We have the name, or rather the first part of it, yet spelled near to the original in the name of a district to the north of the town, which is called "*Lither*land;" and the names of several places in the neighbourhood are doubtless derived from the same source; as, "Ormskirk," "Runcorn," "Wallasea," "Orrell," &c.; as also the names of the two rivers, the "Mersey" and the "Dee."—*John Joynson.*

White Ants.—In reply to P. W. Rogers, respecting ants, he will find the following remedy effectual:—Burn some sulphur in a saucer overnight, and place it in their haunts, repeating it for three successive nights; then whitewash the cupboards all over, mixing a teaspoonful of creosote to every pint of whitewash.—*W. H. G., Somerton, Taunton.*

The Vitrina pellucida.—Having taken a large number of these interesting mollusks this season, I am in a position to affirm that they can completely withdraw themselves within their shells, if by the term "within" we understand that no part of the animal would be cut off supposing a flat surface were drawn across the mouth, similar to the epiphragm of other hybernating and æstivating snails. They are neither very shy nor irritable, and therefore do not retreat on the slightest touch, like some others; but that they can withdraw themselves, I am completely satisfied. The immature animals certainly cannot entirely ensconce themselves, the hinder part of the foot being always "left out in the cold," and also a part of the mantle in front, which is turned back over the shell. There is, however, a vast deal of difference between the contractile power of this species and that of other univalves. I have never been able to see any inside margin of the shell in an adult living specimen, nor have I ever taken one with an epiphragm, which induces me to think they do not hybernate as the Helices and others. But I have found them firmly adhering to pieces of decaying wood in a damp place under wet leaves: this seems, however, to be only a kind of torpor after a heavy glut, for the Vitrine is a great *gourmet*, especially when it can command a poor earthworm for its repast. I am decidedly of opinion that they are a very short-lived race, that their lives seldom indeed exceed nine or ten months; for during the latter part of 1871 I was able to find any number of large or full-sized specimens; now, in the same places, I can only find empty and tenantless shells, and a large number of small or immature animals; and if this be the correct view, there can be no need of hybernation in their case. J. G. Jeffreys, in his "British Conchology," offers no suggestion with regard to the æstivation of the inhabitants of these pretty shells; and, generally speaking, the habits of these animals have not been very closely watched by any British conchologist, most of them contenting themselves with merely copying or echoing the views of M. Moquin-Tandon. Would it not be an interesting occupation for two ar three persons in different parts of the country to take them especially under attention, with a view to comparing notes at the end of the year, and publishing the result of their observations in Science-Gossip, on the conclusion of their labours? Should the idea be thought worth entertaining, I would like to join one or two persons who would be willing to assist in the undertaking. Autumn seems to be the best time for taking full-sized specimens for collections, but the present season is a good one for taking them in order to watch their habits in confinement, since all are now young animals; and I presume that very little preparation would be needed to preserve them, as the Vitrine is not a great traveller, generally remaining in the same leaf-bed the major part of his natural life.—*Hugh Perkins, Sibford, near Banbury.*

Poisoning Dried Plants.—As requested by your correspondent in the last number of Science Gossip, I beg to submit my experience with regard to the above subject. I have never used any poisoning process at all, and though I have had some of the most delicate plants in my possession for five years, I have never been troubled with mould or insects. I think that any persons who are annoyed with either (especially mould) have themselves to blame, as they dry their specimens in too great a hurry. If the plants are carefully dried, it is reasonable to suppose that they will keep for years without the addition of any chemical substance.—*E. McE. H., Glasgow.*

The Tufted Duck.—On or about the 28th of January a specimen of the Tufted Duck (*Anas fuligula* of Pennant), otherwise known as the Black Widgeon, was shot on Wetmoor, near the town of Langport, in Somersetshire. It was a male bird, of the usual dark olive-colour, with this peculiarity, that the greater wing-coverts had much less white about them than ordinary,—merely a narrow white streak in fact, and the lower part of the breast was buff instead of white. Is it not rather unusual to meet with this bird so far west? The variation of colour seems, I think, something uncommon.

The country has been covered with deep water for many miles in this neighbourhood, more so than usual, and wild birds of various kinds have been very numerous.—*P. P.*

Wasps.—It perhaps is not generally known that these insects will hawk at and carry off flies. Sitting one day in my office, I observed a wasp giving chase to a house fly. It captured its quarry on the wing, made a circuit of the room, and then flew to the window, and devoured the fly in less than a minute. Another instance has come under my notice. Walking along a country road during the autumn, my attention was attracted by a buzzing sound, and looking down, I was aware of quite a little cloud of dust raised by a fierce struggle between a wasp and a large fly, commonly known as the "Blue-bottle." Several times the fly shook itself clear of its adversary, but it was too much injured to rise; the wasp very quickly returned to the attack, running swiftly over the ground. I was on the point of taking the poor fly's part by killing them both, but the wasp was too quick for me, and rose on the wing, bearing the fly with it. I however succeeded in knocking them both to the ground by a smart blow with my hat; but although struck down, the wasp kept its voracious hold, rose again, and bore off its prey. I think this an extraordinary example both of the strength and voracity of these insects. —*G. J. L. Lamarque, Dover.*

Geological Guide to Sicily.—Could you tell me if there is any Geological Guide-book to Etna, or Sicily generally? I intend to be a month or two during this summer in Sicily and southern Italy, and should like to observe the more important geological phenomena. There must be a good many books on the subject surely, if one knew where to find them. I have Phillip's "Vesuvius." If I could get something similar for Etna, that would be the very thing. I don't mind whether it is in English or French; German would be better than nothing.—*A Subscriber.*

Justices' Science.—A recent number of *Nature* states that at Chelmsford the magistrates declined to grant the use of the Shirehall for a lecture on the sun, illustrated by experiments in spectrum analysis, on the ground that the electric light might endanger the safety of the building!

Do Animals ever commit Suicide?—In the recently published volume of additional selections from the miscellaneous writings of De Quincey, one paper, rather brief, takes up the question of suicide, and asserts, incidentally, that animals do not, and cannot, be guilty of it. He adduces two cases, on which much stress was laid; one that of a ram, the other of a horse, both of which were supposed to have thrown themselves down a declivity. The occurrences, he believes, were matters of accident; yet, on the other hand, I cannot but think that if animals become mad, as is granted, such a perversion of natural instincts may ensue that self-preservation ceases to hold any sway. And again, the fact that the scorpion, when surrounded by perils, will deliberately sting itself to death, has been reported by a number of independent witnesses.—*J. R. S. C.*

Paste Eels.—I think I am safe in promising disappointment to all who attempt to obtain paste eels in the way suggested by "F. K." in last month's Science-Gossip. I have known many persons try his plan, and the result, in every case, was total failure (unless the receptacle previously held some); and necessarily so: success would be a demonstration of spontaneous generation; and our philosophy has not yet reached that point; and, besides this, there is the fact that these creatures produce young, which would be superfluous if paste *alone* generated them. They are a lively set of interesting beings to every one who possesses a microscope and patience, and easily bred, if a *few specimens are placed on the surface of the paste*, which I prefer rather thin. "F. K." refers to the young, coiled up in the body of the parent; and if reference is made to Science-Gossip of December, their surprising mode of exit thence will be learned.—In a preceding paragraph "F. K." mentions soundings from Porto Seguro; will he favour me with one of his slides in exchange for one prepared from the same material in a different way?—*A. Nicholson, Fareham.*

Cormorants at Home.—"T. J. B." in his notice of habits of cormorants has omitted one very curious practice they pursue. After diving for fish, their wings appear to become too wet to allow of their flying, and it is a very amusing sight to see them standing on rocks with their wings spread out, evidently to dry. This I have witnessed on the north coast of Ireland near the Giant's Causeway, where they are common.—*A. W. M.*

Late Tadpoles.—In the pools of a deep quarry a few miles from here, frequented by Natterjacks (*Bufo calamita*), I saw, so late as November 8th, a dozen or more tadpoles in a half-torpid state, some with, and some without legs. Is this not a somewhat uncommon occurrence?—*W. H. Warner, Kingston, Abingdon.*

Alauda arborea (p. 44).—What bird does Mr. Drew refer to by the name of Tree Pipit (*Alauda arborea*)? *Alauda arborea* is the scientific name of the Woodlark; *Anthus arboreus* that of the Tree Pipit. I suppose he means the latter bird, but has made a mistake in the scientific name.—*W. H. Warner, Kingston, Abingdon.*

Dried Flowers.—I would give "W. W. H." the information asked for with great pleasure, if I knew the process whereby the exquisite little card of flowers which I alluded to had been made to retain their brilliant tints; but very probably the correspondent, or at any rate reader, of Science-Gossip who so kindly sent me the specimen card will see "W. W. H.'s" note, and reply to it.—*Helen E. Watney.*

The Sword-fish.—In the *Leisure Hour* for January is an article on the Sword-fish (*Xiphias gladius*). The description appears to apply more properly to the Saw-fish (*Pristis antiquorum*). Will any correspondent of Science-Gossip say whether the fish described is a new species, or whether the writer of the article has fallen into an error in describing the Saw-fish as the Sword-fish? The former, it is well known, is furnished with a formidable weapon, which is a prolongation of the upper jaw, and which is armed on each side with sharp teeth, extending in a line from base to point. Although the fish has undoubtedly the power of inflicting terrible wounds with the saw, it must be evident to any one that it would be almost impossible for such an instrument to pierce the thick timbers of a ship, more particularly as the point of the saw is blunt and slightly turned up; added to this, the projecting teeth, placed at right angles to the body of the saw, would effectually prevent its entrance into any hard body. The Sword-fish (*Xiphias gladius*) is armed with a very different weapon,—a long, hard, solid horn, a sword often attaining to the length of several feet: with this sword, which is destitute of teeth. the *Xiphias* has been known to penetrate the planks and beams of ships, and, being unable to withdraw it, the weapon has been snapped off and has remained in the timber; or it is probable that the force of the blow has broken off the bone. If my memory serves me, a specimen, fixed in a block of wood cut from a ship's side, is to be seen in the British Museum.—*E. H. R.*

The Ermine in North Wales.—A specimen of the *Mustela erminea* has just been brought in to me by my friend and neighbour Mr. John Jones, of Cae Corrin, one of our mountain farms. It is supposed to be rare, as none of the gamekeepers have ever seen the animal before in these parts. The Stoat, Weasel, &c., are common enough, but this beautiful creature is, so far as we can ascertain, quite a rarity hereabouts.—*W. P.*

Food of Hemiptera and of Snakes.—A couple of very young English snakes, about six or seven inches long, have been in my possession for some weeks. As they had not been observed to take any food, though insects and worms had been inclosed with them, and happening to remember some old tale of a snake being fed by a child on bread and milk, on the chance of their taking it I placed a small portion of this simple diet in their vase. On inspection a short time after, I was surprised to see a hemipterous insect (*Coreus scapha*) busily engaged with its rostrum deep in the mixture, evidently imbibing the liquid portion with considerable relish. It struck me as a curious circumstance for an insect, undoubtedly a vegetable-feeder, to take so readily to this diet, and it seems probable that this large field-bug would have little reluctance to suck blood if the opportunity offered. Perhaps some reader of Science-Gossip will try the experiment, which want of time and other reasons prevent my doing. I should be very glad also to be informed of the food on which such diminutive snakes exist, as they cannot possibly swallow the small mammals and reptiles on which their elder brethren subsist, and no book that I have consulted gives the dinner carte of these interesting juveniles. It should be added that they have not been observed to pay any attention to the bread and milk.—*George Guyon, Ventnor.*

Mounting Objects.—Will any of your correspondents who have tried mounting objects in gum dammar give me their experience? I dissolved the gum in benzole. The solution was clear enough at first, but after a bit it became slightly opalescent. Is this opalescence a disadvantage, as I supposed it to be, and how can it be got rid of? Should the solution of the gum be saturated?—*W. L. Nash.*

The Shrew-mouse (p. 45).—The word "shrew" is applied to *Sorex araneus* in the sense of "evil:" it means the *malign* mouse, an animal supposed to work evil by means of magic spells, as is the case with the evil-eye, a superstition still lingering in some remote parts of the country. Etymologically, the word "shrew" is allied to the German "schräge" in the sense of *awry;* the Anglo-Saxon form is "screawa," connected with old English "schreward," a rascal; cf. "schrewd," as malicious, badly disposed; *i.e.*, not simple, innocent and confiding, but wickedly informed, wily, artful, too knowing, The Danish word quoted from Bailey appears to be meant for "skovmuus," the *Myoxus, i.e.* the Wood-mouse; cf. German "Feldratze." The *shrew,* in German, is "die Spitzmaus," in allusion to its *pointed* snout.—*A. Hall.*

The Chameleon.—A friend of mine is anxious to find out the secret, if there be one, of acclimatizing the Chameleon. He has made one or two attempts, but to his grief failed in both. My friend's house is situated in a valley near the castle of Nottingham, well sheltered from the cold north and east winds, altogether one of the prettiest, warmest, and sunniest parts of our good old town. Below the house, a little further down the valley, having a full southern aspect, stands a greenhouse full of choice exotic plants, and consequently very warm, where he kept a lovely specimen of the *Chamæleo* tribe, which had been presented to him. The charming little creature's habits of life were to my friend a curious and interesting study. Slow and cautious in its movements, yet ever on the *qui vive* for insect prey, which it rapidly caught with its tongue. Its bright eyes gleamed with eager watchfulness, no action or movement seeming to escape its notice: in fact, it was a most wonderful and novel pet. Its great power of abstinence from food, and very extraordinary manner of gulping in the air and puffing out its body to twice its size, formed a most amusing study. One day, however, death paid a visit to the poor little chameleon's home. In time another chameleon took its place, and it also perished. My friend fancies the climate is too cold, and that it was the change from their tropical homes which caused the death of the two chameleons. They had a plentiful supply of insects, and their death was not caused by the old woman's fable, that "the chameleon lives on air," and as in a case which came under my notice some years ago, when a poor animal was starved to death simply through stupid ignorance. We are aware that these reptiles are most successfully kept in the Zoological Gardens in London, and I should be glad if any of the correspondents of Science-Gossip could give my friend a little information on this point.—*Barbara Wallace Fyfe, Nottingham.*

NOTICES TO CORRESPONDENTS.

All communications relative to advertisements, post-office orders, and orders for the supply of this Journal, should be addressed to the Publisher. All contributions, books, and pamphlets for the Editor should be sent to 192, Piccadilly, London, W. To avoid disappointment, contributions should not be received later than the 15th of each month. *No notice whatever can be taken of communications which do not contain the name and address of the writer*, not necessarily for publication, if desired to be withheld. We do not undertake to answer any queries not specially connected with Natural History, in accordance with our acceptance of that term; nor can we answer queries which might be solved by the correspondent by an appeal to any elementary book on the subject.

A. N.—Gum dammar is used for mounting purposes, instead of Canada balsam. The following is the recipe:—Dissolve one ounce of gum dammar in one fluid ounce of turpentine; dissolve one ounce of mastic in two fluid ounces of chloroform. Filter both liquids, and then mix.

J. S. T.—The land-shells sent are *Clausilia laminiata*.

M. T., Croydon.—The fern sent is *Pteris hastata*; but the fronds are young, so as to render identification somewhat difficult. It comes from the Cape of Good Hope, and was introduced into this country in the year 1823.

T. A., Leeds.—The mould growing on a Beaufoy vinegar-cask in a damp cellar belongs to the order *Mucedines*. It is *Rhinotrichum lanosum*.

E. L.—1. *Nucleolites dimidiatus*; 2. Spine of *Cidaris*, from the Middle Oolite. Not of much value for exchange, unless they are in a better state than those sent. They are evidently Drift specimens. The fossils above mentioned are characteristic of the Middle Oolite.

W. D. Roebuck.—1. *Agriotes obscurus* (the larva of which is one of the "wire-worms"). 2. *Coccinella 11-punctata* (*C. dispar* is only a dark form of *C. bipunctata*, and is black, with about four red markings; not red, with eleven black spots, as in this insect). 3. *Notiophilus substriatus*. 4. *Calathus melanocephalus*. There are no works whereby *exclusively British* Coleoptera can be named. Stephens's "Manual" professed to supply this want, but is now quite obsolete and unreliable. Spry and Shuckard give recognizable outline figures of most of the now acknowledged British genera; but the student must rely on the standard European works by Erichson, Kraatz, Thomson, and others. For information on this and other points see Rye's "British Beetles," Lovell Reeve & Co., 10s. 6d.

R. S., Belper.—The scales on the slide sent are those of some species of *Macrotoma*, perhaps *M. plumbea*. The scales of the forms belonging to this genus show affinities to those of *Lepisma*. See Sir John Lubbock's paper on the *Thysanura*, in the "Trans. Linnean Soc.," and Mr. McIntyre's Notes on the Scale-bearing *Podurœ*, in vol. i. of the *Monthly Microscopical Journal*.—*F. K.*

F. W. Harris, Jun.—Doubtless the growth of the mould would be caused by damp in the first instance. A very slight degree of damp is sufficient. The mould may be destroyed by the application of spirits of wine with a camel's-hair pencil, and if a small quantity of bichloride of mercury (corrosive sublimate) is dissolved in the spirits of wine, it will prevent the specimens from being again attacked The proportion should be about six grains of bichloride of mercury to an ounce of spirit.

Capt. Perry, Liverpool.—The slide came to hand with the centre smashed; enough, however, remained for examination. The forms are neither foraminifera nor diatoms, but concretions of carbonate of lime, probably identical with those found in the skin of the shrimp or prawn. If examined by means of polarized light, the globules will display the black cross precisely the same as seen in the shrimp or prawn; if the tentacles of the *Physalia* had been examined soon after its capture, the globules would have been seen *in situ*.—*F. K.*

EXCHANGES.

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

Wanted Microscopic leaf fungi (unmounted); objects of interest in return. Lists exchanged.—H. D., 1, Stanley Road, Waterloo, Liverpool.

Tongue, eye, or spiracle of Drone-fly, professionally prepared and well mounted, offered for transparent section of coal or granite.—C. D., 187, Oxford Street, Mile End, E.

Helix revelata for *Clausilia Rolphii*.—John Purdue Ridgeway, Plympton, Devon.

Nos. 75, 157, 158, 160, 679, 686, 1149, 1165, 1272, &c. &c., Lond. Cat., for other plants.—G. H., 57, Bell Street, Calton, Glasgow.

Ferns, including *Woodwardia radicans, Hypolepis repens, Phymatodia interquafolia*, and others, in exchange for others new to me.—Address, L. B., Shooter's Hills, near Longton, Staffordshire.

Wanted, well-mounted anatomical injections, transparent and opaque. State what is wanted in return.—Capt. J. A. Perry, 42, Speelow Lane, Liverpool.

Exchange.—Prepared Skin of Sole (unmounted) for Scale of Carp.—Miss Edith Meyrick, Downshire Lodge, Blessington, co. Wicklow, Ireland.

Cretaceous Fossils of Cambridge in exchange for fossils of other formations.—W. J. S., 9, Victoria Street, Cambridge.

Transparent sections of fossilized lath wood. Send stamped envelope. Any Microscopic material acceptable.—Address, Charles Butterworth, 4, Sandy Lane, Shaw, near Oldham.

Carboniferous Fossils in exchange for Devonian and Silurian.—S. Barmingham, Arkendale, Reeth, Yorkshire.

For Pollen of *Digitalis purpurea* send stamped envelope to T. H. Martin, 86, Week Street, Maidstone.

Ten Microscopic objects (well mounted and clean) for well-mounted objects showing anatomy, &c., of Coleoptera and Lepidoptera. For list and particulars address J. W. Barwell, Messrs. Winstanley's, Huyton, near Liverpool.

Cuticle of Palmyra Leaf (from Ceylon) prepared for polariscope (unmounted), offered for stamped envelope, and any object of microscopical interest (*except botanical*).—B. Bellingham, Brierly Hill, Staffordshire.

Slides of beautiful diatoms from the Yarrow, Melbourne, Victoria, in exchange for other equally good slides.—A. N., Fareham.

Fossil Diatomaceæ, from Caithness (cleaned), very rich in species, for good Microscopic objects; also a few Oolitic fossils, from Sebastopol, for characteristic fossils (mesozoic preferred).—Wm. C. Crawford, Eagle Foundry, Glasgow.

For section of Sarsaparilla stem, send envelope to Walter White, Dereham Road, Norwich. Any good material acceptable.

Wanted *Hyalonema mirabilis* for *Euplectella speciosa*.—Mr. Hambrook, Stroud Street, Dover.

Wanted *Phasgonura viridissima* (Great Green Grass-hopper) and *Spongilla fluviatilis* (Fresh-water Sponge), for specimens.—Rev. H. H. Higgins, Rainhill, Liverpool.

Wanted live eggs of Silkworm for Microscopic slides.—J. Barrow, 3, Egerton Terrace, Birch Lane, Longsight, Manchester.

Peruvian Guano offered in exchange for good mounted objects.—G. Bowen, 95, Hampton Street, Birmingham.

C. Duplaris, *N. C. nigrum, A. Rufina, O. Macilenta, S. Satellitia, H. Cerago, H. Silago, A. Aprilina, H. Proteus, A. pyramidea, M. Oxycanthæ*, &c., for exchange.—Joseph Anderson, Jun., Alresford, Hants.

BOOKS RECEIVED.

"Contributions to a Flora of Berkshire." By James Britten, F.L.S.

"The Eighth Annual Report of the Belfast Naturalists' Club."

"The Zoologist." February.

"The Canadian Naturalist."

"The Journal of Botany." February.

"Annals of Natural History." February.

"Entomologist's Monthly Magazine." February.

"The American Naturalist." January.

"Guide to the Crystal Palace Aquarium."

"Notes on Chalcidiæ." By F. Walker, F.L.S.

"Deschanel's Natural Philosophy." By Professor Everett. Blackie & Sons, London, Glasgow, and Edinburgh.

"Worms: a Series of Lectures on Practical Helminthology." By Dr. Spencer Cobbold, F.R.S., &c. London: J. & A. Churchill.

Communications Received.—R. B.—F. K.—G. H. K.—W. D. R.—J. A.—C. H.—H. E. W.—H. F. M.—A. H.—E. H. R. W. L. N.—W. P.—B. W. F.—J. B.—G. B.—R. S.—L. H.—J. J.—A. N.—J. B.—T. H M.—W. J. S.—J. R.—S. C.—P. P. —E. McH.—H. P.—W. H.—J. S. T.—J. A. P.—J. T.—E. M. —C. B.—S. B.—C. K.—W. C.—W. A. T.—G. J. L. L.—R. T. L.—W. H. G.—W. W.—J. H.—H. D.—C. J. D.—Captain P.—J. O.—C. L.—T. B.—A. E.—B. B.—F. J. W. —A. N. F.—T. W. H.—J. N.—G. H.—Dr. H. F.—G. H. H.—G. B. P. (Lynn).

COLLECTING AND PRESERVING.

No. III.—BIRDS' EGGS.

By Thomas Southwell, F.Z.S.

BEFORE saying a word as to preparing specimens for the cabinet, I wish to impress upon the young oologist the absolute necessity for using the greatest care and diligence in order satisfactorily to identify, beyond possibility of doubt, every specimen before he admits it to his collection. Without such precautions, what might otherwise be a valuable collection is absolutely worthless; and it is better to have a small collection of authentic specimens than a much larger one, the history of which is not perfectly satisfactory; in fact, it is a good rule to banish from the cabinet every egg which is open to the slightest doubt. There are some eggs which, when mixed, the most experienced oologist will find it impossible to separate with certainty, and which cannot be identified when once they are removed from the nest.

The difficulties in the way of authentication are by no means slight, but space will not allow me to dwell upon them; the most ready means, however, is that of watching the old bird to the nest, although, even in this, as the collector will find by experience, there is a certain liability to error. In collecting abroad it will be found absolutely necessary (however reluctant we may be to sacrifice life) to procure one of the parents with the nest and eggs. As we are writing for beginners at home, we trust such a measure will rarely be necessary; but that an accurate knowledge of the appearance of the bird, its nesting habits, the situation, and the materials of which the nest is composed, will be found amply sufficient to identify the eggs of our familiar birds. This knowledge of course is only to be obtained by patient and long observation, but it is just by such means that the student obtains the practical insight into the habits and peculiarities of the objects of his study, together with the careful and exact method of recording his observations, which eventually enable him to take his place amongst the more severely scientific naturalists whom he desires to emulate.

I will first describe the tools required, and then proceed to the mode of using them.

Figs. 49, 50. Drills for perforating Birds' Eggs.

Figs. 49 and 50 are drills used for making the hole in the side of the egg from which the contents are discharged by means of the blowpipe, fig. 51. Fig. 49 has a steel point, brass ferrule, and ebony handle, and may be used for eggs up to the size of the Wood-pigeon's; fig. 50 is all steel, the handle octagonal, to give a firm hold to the fingers in turning it, and may be used for eggs from the size of the Wood-pigeon's upwards. The points of both are finely cut like the teeth of a file, but longitudinally. The blowpipe, fig. 51, is about 5½ inches in length (measured along the curve), and is made of German silver, which from its cleanliness, lightness, and freedom from corrosion, will be found the most suitable: it should be light and tapering, and with a ring at the upper end, to prevent it from slipping out of the mouth when used. A piece of thin wire, fig. 52, should be kept in the tube when not in use, to prevent it from becoming stopped up by any foreign substance. A common jeweller's blowpipe may be used for large eggs, such as those of gulls and ducks. Fig. 53 is a small glass bulb-tube, which may be used for sucking out the contents of very delicate eggs, and other purposes, which will be explained hereafter. The small drill and blowpipe may be carried inside the cover of the note-books.

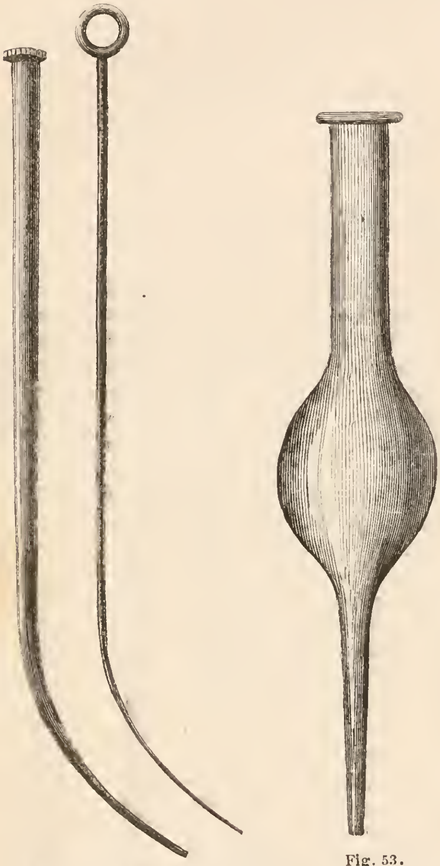


Fig. 51. German silver Blowpipe. Fig. 52. Wire for unstopping ditto. Fig. 53. Glass Bulb-tube, for sucking eggs.

The sooner a fresh egg is emptied of its contents after it is taken from the nest the better: this should be done by making a hole in the side with the drill (choosing the side which is least conspicuously marked) by working it gently backwards and forwards between the forefinger and thumb, and taking great care not to press too heavily, or the egg will burst with the outward pressure of the drill: a very small hole will generally be found sufficient. When this is done, take the egg in the left hand with the hole *downwards*, introduce the blowpipe, by blowing gently through which the contents may soon be forced out. Water should then be introduced by means of a syringe or the bulb-tube, which may be filled and blown into the egg. After shaking, blow the water out again by means of the blowpipe; repeat this till the egg is free from any remains of the yolk or white: should the egg not be quite fresh, it will require more washing. Care should be taken to wet the surface of the egg as little as possible. After washing the interior, lay the egg, with the hole downwards, on a pad of blotting-paper to drain till it is quite dry. Should the eggs be much incubated, I should recommend that the old birds be left to complete their labour of love; but a valuable egg may be made available by carefully cutting a piece out of the side, extracting the young one, and, after replacing the piece of shell with strong gum-water, covering the join with a slip of very thin silk-paper, which may be tinted so as to resemble the egg, and will scarcely be noticed. This is a very rough way of proceeding, however, compared with Professor Newton's plan of gumming several thicknesses of fine paper over the side of the egg to strengthen it, through which the hole is drilled; the young chick is then cut into small pieces by means of suitable instruments, and the pieces removed with others:* the paper is then damped and removed from the egg.

The old plan of making two holes in the side of the egg is very objectionable: a hole at each end is still worse. Many eggs would be completely spoiled by washing, none improved. There is no necessity for washing at all, except such as are very filthy, and these eggs (which you may be sure are not fresh) are not such as should be willingly accepted as specimens: a *little* dirt only adds to the natural appearance of the egg, washing in most cases certainly does not. Never use varnish to the shell; it imparts a gloss which is not natural: all eggs should not have a polished appearance like those of the Woodpecker. Corrosive sublimate dissolved in spirits of wine may be applied as a wash to the inside of eggs which are not fresh when blown, as the lining in such is very liable to decay, or to be attacked by insects. It should be used very carefully as follows:—Suck a small quantity up into the bulb-tube and discharge it into the egg; after shaking it, to insure the entire surface being wetted by the solution, blow out the superfluous moisture and allow the egg to dry. Should the yolk be dried to the side of the egg, a solution of carbonate of soda should be introduced: let it remain till the contents are softened, then blow out and wash well. Great care must be taken not to allow the solution to come in contact with the outside of the egg. Having blown the egg, and allowed the inside to become quite dry, procure some thin silk-paper gummed on one side, and with a harness-maker's punch

* "Suggestions for forming Collections of Birds' Eggs." By Professor Newton. Written for the Smithsonian Institution of Washington, and republished by Newman, 9, Devonshire Street, Bishopsgate.

cut out a number of little tickets suitable to the size of the hole in the egg, moisten one of these, and place it with the gum side downwards over the hole, so as to quite cover it; cover the ticket with a coat of varnish, which will render it air-tight and prevent its being affected by moisture. The egg thus treated will have all the appearance of a perfect specimen, and if kept from the light will suffer very little from fading.

The note-book has been mentioned: this should be a constant companion; nothing should be left to memory. When an egg is taken, a temporary pencil number should at once be placed upon it, and this number should correspond with the number attached to an entry in the note-book, describing the nest (if not removed), its situation, number of eggs, day of month, and any other particular of interest. When the egg is ready for the cabinet, as much of this information (certainly, name, date, and locality) should be indelibly marked upon it, as conveniently as can be done (neatly, of course, and on the under side); also the number referring to the collector's general list of his collection, into which the important parts of the entry from the note-book should be copied. Never trust to gummed labels, which are always liable to come off: by writing the necessary particulars upon the egg itself there can be no confusion or mistake. Most collectors have their own plan of cataloguing their collection. I have adopted the following, which I find to answer very well. Obtain a blank paper book, the size of common letter-paper, rule a horizontal line across the centre of each page, and make a complete list of British birds, placing only two names on each page, one at the head of each division, prefixing a progressive number to each name: this number is to agree with that marked on the egg of the species named. Then follow the locality whence the egg came, by whom taken (if not by myself), or how it came into my possession, with any other particular worthy of note. With all eggs received in exchange or otherwise, this note should, if possible, be obtained in the handwriting of the person from whom they are received, and the slip on which it is written be affixed in the book under the number. When specimens of the eggs of the same species are obtained from various localities, those from each locality should be distinguished by a letter prefixed to the number. The plan will be better understood by referring to the following extract:—

62. GREAT SEDGE-WARBLER (*Sylvia turtoides*, Meyer).

62. Received of ——, from the cabinet of Mr. ——.

*a*62. Taken by ——, a servant of ——, on the banks of the river Tongrep, near Valkenswaard, in the south of Holland, on the 9th June, 1855. The birds may be heard a long way off by their incessant "Kara, Kara, Kara." A few years ago not one was to be found near Valkenswaard.

A. B——

*b*62. Bought at Antwerp in August, 1865.

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118. MEALY RED-POLE (*Fringilla borealis*, Tew.).

118. Nyborg, at the head of Mask Fjord (one of the two branches into which Warangar Fjord divides), East Finmark, Norway, July, 1855. The birds were very plentiful, and only one species seen, which appears quite identical with that which visits England every winter.

C. D. E——

By means of these entries, and the corresponding number on the egg, mistakes are impossible, and the name and history of each egg would be quite as well known to a stranger as to the possessor. It needs not to be said that this catalogue is replete with the deepest interest to its compiler. In it he sees the record of many a holiday trip and many a successful find. Some of its entries,—for the earliest date back five-and-twenty years, are memorials of companions long since dead, or separated by rolling oceans, but on whose early friendship it is a pleasure to dwell.

Nothing can be more vexatious and disappointing than the receipt of a box of valuable eggs in a smashed or injured condition from want of care or knowledge of the proper method of packing. A simple method is recommended by Professor Newton, which, from experience, I can confidently recommend:—Roll each egg in tow, wool, or some elastic material, and pack them closely in a stout box, leaving no vacant space for them to shake; or a layer of soft material may be placed at the bottom of the box, and upon it a layer of eggs, each one wrapped loosely in old newspaper; upon this another layer of wool or moss, then again eggs, and packing alternately until the box is quite full. Bran, sawdust, &c., should never be used; and it should be ascertained that the box is quite filled, so that no shaking or settlement can occur.

Almost every collector has his own plan for constructing his cabinet, and displaying his collection. The beginner, if left to himself, will find it a matter of no small difficulty, and many will be the changes before he arrives at one at all satisfactory. Mr. Osbert Salvin has invented a plan which I think as near perfection as it is possible to arrive at, and through his kindness I am enabled to give a brief description of it. In the first place his cabinets are so constructed that the drawers, of different depths, are interchangeable. This is effected by placing the runners, which carry the drawers, at a fixed distance from each other, and making the depth of each drawer a multiple of the distance between the runners. For example: if the runners are $\frac{3}{4}$ of an inch off each other, then let the drawers be $1\frac{1}{2}$, $2\frac{1}{4}$, 3, $3\frac{3}{4}$, $4\frac{1}{2}$, &c., inches deep. All these drawers will be perfectly interchangeable, and a drawer deep enough to hold an ostrich's egg can in a few moments be placed amongst those containing warblers': every requirement of expansion and rearrangement will be vastly facilitated, involving none of those radical changes so worrying to a collector.* Mr. Salvin's plan of arranging the eggs is equally simple, and admits of any amount of change with very little trouble. Each drawer is divided longitudinally by thin slips of wood into three or more parts, about 4 to 6 inches across, as may be convenient; a number of sliding stages are then constructed of card-board, by cutting the card-board half through, at exactly the width of the partition, and bending the sides down to raise the stage to the required height. A section of one of these stages will be seen in fig. 54, and the arrangement in the drawer at fig. 55. A number of oval holes are then to be cut by hand, or with a wadding-punch of suitable size (altered in shape by hammering), and a thin layer of cotton-wool gummed on the upper surface of the stage: the holes, of course, should be suitable in size to the egg they are intended to receive. Between these stages sliding partitions must be placed: these should be made of just sufficient height that the horizontal part may fit closely on the wool, as shown at fig. 54. These partitions should be made of thin wood for the upright part, along which a horizontal strip of card-board is to be fastened with glue, on which is to be placed a label bearing the name of the species of egg displayed on the stage, as seen in fig. 55. All this will be better understood by referring to the figures.

Fig. 54. Section of Sliding Stage.

Fig. 54 represents a longitudinal section of one of the stages in its place, with the ends of the two next; showing the card-board stage, the cotton-wool, the sliding partition, and the horizontal slip of card-board to carry the label.

Fig. 55 represents one of the drawers on Mr. Salvin's plan; it is divided into three parts (1, 2, 3) by fixed partitions. No. 1 is represented empty; No. 2 with the specimens arranged; No. 3, with two stages and two of the movable partitions.

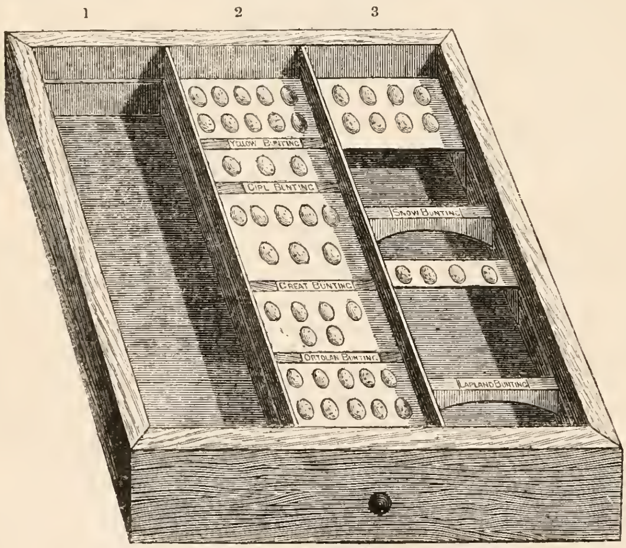

Fig. 55. Cabinet Drawer on Mr. Salvin's plan.

This may appear very complicated at first sight, but a few trials will be sufficient to master the details, and the result will be very beautiful if neatly carried out. The eggs are well shown, not liable to fall out of their places, and it is very little trouble to alter the arrangement, every part being movable. Each drawer should be covered by a sheet of glass to exclude dust.

Mr. Salvin's cabinet is an excellent one for holding the nests of birds, which should be removed with as little damage as possible, and placed in the drawers, under cover of glass. Great care must be taken to keep them free from moth, to which they are very liable; for this purpose they should be dressed with the solution of corrosive sublimate.

The young collector should remember that what is worth doing at all is worth doing well, and that the care bestowed upon his cabinet is not labour in vain; habits of exactness, and precision of arrangement, are absolutely necessary if he would make the best use of the materials which come in his way;

* Of course, cabinets thus constructed will be found equally convenient for collections of bird-skins, fossils, &c.

and, above all, never let him degenerate into the mere collector: his collection should be for use, and not merely ornamental.

ON CHANGES IN THE LOCALITIES OF SOME OF THE RARER ENGLISH PLANTS.

THE query of a correspondent in the January number of SCIENCE-GOSSIP (p. 19) incites me to make a few observations on the localities of some of the rarer plants of England, and the alterations that may have occurred in several instances, which are very tantalizing to a collector. Compilers of Floras and Manuals copy localities from each other too often without inquiring if they still continue as in years past, and thus a student or collector who depends upon "Botanists' Guides," or even local catalogues (except of very recent date), will be often disappointed in his researches. It is perhaps hardly to be expected that technical writers on the British Flora, chiefly careful to note the characters of plants, will trouble themselves about localities, when they find them already recorded by good observers, and may of course presume that the plants retain the positions assigned them. But still I think that, in the case of very local species, a coadjutor might be called in who could make inquiries, and might easily get information from well-known botanists in the counties where these rare plants were said to grow, whether they still continued as placed by former observers, had remained in the spots indicated, spread farther, or become altogether extinct. This would add but little to the letter-press of Floras, where there is generally plenty of blank space, and the advantage to collecting practical botanists would be important, while it would be an advantage to science if the date were given when the local plant was last observed.

Mr. A. French, of Banbury, inquires as to *Thlaspi perfoliatum*, which, as one of our rarest cruciferous plants, certainly requires to be specially noted as to its places of growth. The neighbourhood of Witney and Burford, Oxfordshire, was given by Sibthorpe and Sir James Smith, as localities for this plant many years ago, and I presume that Walker, in his "Flora of Oxfordshire," would satisfy himself that it was there. Dr. Hooker, in his recently published "Student's Flora," merely gives "Oxford and Gloucestershire," without designating any particular spot. I believe, however, that Saperton was intended in the latter county, where the *Thlaspi* was gathered by a member of the Cotteswolde Field Club. It may probably still remain somewhere about Witney and Burford, but the plant has extended its range in a northern direction of late years, as it is now to be found in some plenty at a place called "Hyate's Pits," an abandoned quarry of oölitic stone in the parish of Snow's Hill, Gloucestershire, though very close to Broadway, in Worcestershire; and I have also a specimen from Evenlode, Worcestershire, which is, however, in the oölite district. It is certainly important to know whether a rare plant has increased or diminished, as in the former case its claims to be considered truly indigenous are better founded.

There are certain plants found in Britain limited to particular localities, from which they never wander, and which, nevertheless, may be considered true natives, though some of them have got under the ban of Mr. Watson as "denizens," a name that I by no means approve. For why should the *Cotoneaster vulgaris* or the *Potentilla rupestris*, which are both confined to single rocks in Wales, be considered "native," while *Eryngium campestre*, found in several spots both in England and Wales, distant from each other, is placed merely as a "denizen"? With regard to this latter plant, said, I think incorrectly, to be found "near ballast-heaps," but which I have seen growing on Worle Hill, Weston-super-Mare, far from any ballast, and in a truly natural position, I can adduce another truly inland locality, having seen the leaves of the plants freshly gathered from a waste spot between Tedstone, Herefordshire, and Upper Sapey, Worcestershire, in August, 1867. This is a plant not often to be met with in flower, but its leaves are characteristic and cannot be mistaken.

Complaints are frequently made by collecting botanists that they cannot find a plant at the spot indicated, which perhaps has been too hastily searched, and should have a second visit, unless some sagacious "old inhabitant" can be met with. On my first visit to Craig Breidden, I could not hit upon the exact spot for *Potentilla rupestris*, but found it the following day. So I had to explore Braunton Burrows, a wide expanse of sandhills and marshy ground, ere I could detect the very rare *Isolepis* (or *Scirpus*) *holoschœnus*, though it was plentiful in one particular spot in a hollow easily overlooked. Rambling botanists must not therefore be too hasty in their conclusions.

It would not be easy to find *Draba aizoides* on the rocks of the coast of Glamorgan, but it grows kindly on the adjacent walls of Pennard Castle, and will no doubt continue to do so until some change of circumstances determines the fate of the ruinated castle itself. I heard that the botanists of the Severn Valley Field Club made an excursion last year to Stokesay, in Shropshire, to gather the *Astrantia major*, which grows near that place on a Silurian limestone eminence, called the View Edge, its only locality in Britain; and notwithstanding a diligent hunt, they failed to detect the plant; yet the same year, guided by a neighbouring clergyman (Rev. J. D. La Touche), I observed the *Astrantia* in three several spots within the wood upon the hill-side.

It must be noted, however, that some seasons are more favourable to plants than others, so that in particular years certain species may not appear at all, or in very diminished numbers. This is especially the case with certain of the *Orchidiæ*. I have been in Wyre Forest, near Bewdley, when its glades were adorned with the elegant white flowers of hundreds of the *Cephalanthera ensifolia*; yet last year, when searching over the same forest ground, I could not meet with a single specimen. I have noticed the same thing in other places with regard to *Spiranthes autumnalis*, which, seen plentifully in one particular season, could not be observed the next. *Epipogium Gmelini* (or *aphyllum*), though gathered a few years since at Tedstone, Herefordshire, has not been seen since, though it may possibly reappear under favourable circumstances. In woody ground the fallage of trees and shrubs often determines the appearance of plants for a time, till the ground is shadowed over again by a dense growth of thickets and brambles. So where local plants grow about quarries, the displacement of the ground removes them, as I have noticed with regard to *Carex humilis* on Worle Hill, Somerset, where extensive quarries have been developed. Commons and waste ground, too, get inclosed, broken up, and built upon, and so local plants are extinguished, unless they can take shelter in an undisturbed corner. I noticed the uncommon *Bupleurum tenuissimum* on Ealing Common, Middlesex, some years ago, and *Myosurus minimus* at the then rural hamlet of Perivale, in the same vicinity; but such changes have since taken place there, and numerous villas erected, that probably the plants mentioned may never be seen there again.

Thus it is that advancing civilization acts upon the plants of a country; old localities are blotted out and new ones have to be observed and noted. Mr. Newman remarks, with regard to the local fern *Asplenium lanceolatum*, that "the vicinity of Barmouth (Merionethshire) seems a very favourite locality for this fern;" and it used to be quite abundant on the rocks and walls by the roadside there. But Barmouth has increased as a watering-place, and a railroad brings numerous summer visitors, among whom have been unscrupulous marauders, who have carried off the rare *Asplenium*, so that when I was at Barmouth last summer not a single plant could I see anywhere about. Nevertheless I discovered the fern on stone walls at Pant Einon, a few miles south of Barmouth, on the opposite side of the river Mawddach. I need not give further instances illustrative of the subject touched upon, as I have said enough to show the advantage of reporting recent observations on the changes of locality in the rarer plants, or their permanence at particular spots; and where changes have occurred they should be noticed in the new editions of general floras.

EDWIN LEES, F.L.S.

Green Hill, Worcester, March 8, 1872.

THE NEW RHINOCEROS AT THE ZOOLOGICAL GARDENS.

OF all the recent additions to the magnificent collection of the Zoological Society, few will be of more interest to the intelligent sight-seer than the Sumatran Rhinoceros. We paid a visit, a few days ago, to this animal, under the able guidance of Mr. Bartlett, and saw his surly bruteship rolled up in all the unapproachable dignity of one who has just dined, and does not care to be disturbed.

After a few probes, assisted by bribes in the shape of biscuits, we managed to get it on its legs. Its appearance, thus seen, is very remarkable. It is not so large as the Indian or African species, and seems longer in proportion to its height. Its hide resembles that of its African brother, rather than its Indian, in being freer from the huge folds into which the thick skin of the Indian species is thrown, and which adds so much to the repulsive appearance of the latter. Its head is more elongated and pig-like than either, and its lower jaw is distinguished by being squarely cut; whereas in the two former it is more tapering, and so far is conformable to the upper part. Like the African species, the new arrival is marked by having its ears fringed with a long reddish hair, which gives it a very fierce look. This hair, however, is much longer and thicker than that on the ears of the African Rhinoceros, so that the ears themselves look longer and larger in consequence. It resembles the African species more than the Indian, also, in being two-horned.

Singular as it may seem, that a rhinoceros from the Indian region (Sumatra) should in so many respects resemble the African species more than that which is so well known to us as the "Indian" Rhinoceros, yet we think that even this peculiarity is secondary to the still more striking similarity between the animal of which we are speaking and a species which has been extinct probably since the appearance of man on the earth. We allude to that known as *Rhinoceros tichorhinus*, whose remains are usually found in the same post-glacial deposits as the Mammoth (*Elephas primigenius*). The long hair on the ears of our Sumatran species has already been mentioned, and so far this feature is partly shared by the African type. There, however, the resemblance stops, for the Sumatran Rhinoceros has the whole of its body more or less covered with short, brown, woolly hair; the hair on the back is longer, and like the "hog mane" of a horse. Indeed, so peculiar is this hirsute covering, that the species almost deserves the name of "hairy."

In this respect, therefore, it at once puts us in mind of the *Rhinoceros tichorhinus*, or "Woolly-haired Rhinoceros," whose bones and teeth are found in our bone-caverns and river-gravels. The latter was found, as a frozen carcass, in the intensely frozen soils of Siberia; and described by Pallas in 1793. This was before the discovery of a contemporaneous hairy elephant. But the woolly hair of the extinct species was much longer, and was evidently an adaptation to the rigorous circumstances under which the animals provided with it had to exist. There are other features shared partly in common between the extinct type and the animal in the Zoological Gardens. The former was two-horned, like the latter, and its teeth and bones indicate a close resemblance, as far as size is concerned. We conclude, therefore, that it is not impossible the Sumatran species may be a lineal descendant of the extinct *Rhinoceros tichorhinus*. Siberia, where the latter seems last to have roamed, is more intimately connected with India than is any other part of the globe; the Indian tiger still finds its way thither, when forced by hunger; and the short woolly hair of the Sumatran Rhinoceros may be the relics of a covering which once formed no unimportant character to the northern progenitor of the species we are dwelling upon. Further, the occurrence of this species on the island of Sumatra at once shows that it must have extended thither before the separation of that island from the Indian continent, as the sea is by far too extensive for it to have crossed by swimming. Its geographical distribution, therefore, is a good proof of its antiquity; whilst its general replacement in India by the Indian species would lead us to infer that the latter and dominant species was the most recently introduced. We strongly advise all our readers who have the opportunity to pay a visit to an animal which seems, in many respects, to be one of the "missing links." J. E. TAYLOR.

A GOSSIP ABOUT BLACKCAP WARBLERS.

AFTER hearing Mr. Rudd's excellent "Gossip about Canaries" in the March number of SCIENCE-GOSSIP, I thought it might perhaps both interest and profit some of your readers to learn a little of my experience in the treatment of the above graceful and beautiful birds. As a cage bird, with proper care, I know of none which at the same time is so tame and so well repays the little trouble he gives by his wild and rich song, in which he excels every chorister of the grove as regards rapidity and clearness. Mudie says "that although the Blackcap Warbler has not the volume and variety of the Nightingale, nor the ineffably sweet chant of the Garden Warbler, its notes take us by surprise, and the changes, and especially the trills, are finer than those of any other bird."

I have never been without several of these birds in cages. They readily take to confinement, and never seem to repine at their lot, or sulk and mope as is often the case with the Nightingale; they are also easy to manage at the moulting and migratory seasons. I have had them so tame that they would perch on the finger and take any insect offered them. Of all insects they, however, have a preference for the spider and the mealworm.

The Blackcap being both insectivorous and frugivorous, requires a blending of the two in confinement. I have always found the following the best standard food for both the Blackcap and all other warblers:—Ants' eggs, one teaspoonful; chopped cabbage, one ounce; currants (grocer's), one ounce; powdered rusks, one ounce; hempseed, one ounce; German paste, one ounce; the yolks of two hard-boiled eggs, which should be well rubbed up with the rusk and hempseed, and then all mixed together.

The *best* German paste is made from Mr. Adams's recipe; viz., Take 2 ounces bullock's liver boiled and grated; 6 ounces pea-meal, 4 ounces stale bread-crumbs finely rubbed; the raw yolk of one fresh egg. Mix these well together; then put into a clean frying-pan gently heated, one ounce of unsalted butter; add the above mixture; place the frying-pan on a very slow fire, stir till a little brown; when taken off the fire and still warm, mix 2 ounces coarse sugar; let the whole stand in the pan till quite cold, then add 12 ounces ground hempseed and 1 ounce of maw-seed. Mix the whole well together, and leave the compound in grains about the size of canary-seed; then put into pots well covered up. The embers of a fire answer best in making this paste, as the nourishment is destroyed if it is burnt, and if not equally and gently done it is apt to mould. A uniform and rich brown is the proper colour.

Mr. Sweet, who first kept the Blackcap successfully, always used scalded bread-crumbs and powdered hemp-seed scalded and mixed together with some finely-chopped beef or yolk of egg hard boiled. This forms an excellent change from the former food; as is likewise scalded rusk biscuit with all the superfluous water pressed out, and as much milk added as the rusk will take up. This would be good for them once or twice a week, but not oftener, as milk used too often makes the feathers fall off, and brings on consumption by relaxation of the bowels. The Blackcap is also fond of curds, which may be made in a homely way by placing in a clean pan half a pint of new milk, placing it on the fire, and, when just at the boiling point, put into it a tablespoonful of vinegar, which coagulates it; then run through a colander and wash the curds with cold water, so that no sour taste is left. I have often used with good effect the Nightingale's staple food; viz., equal parts of very finely-minced beef and yolk of hard-boiled egg well mixed together and nicely chopped into small pieces: this some blackcaps are very fond of, whilst I have noticed others would not touch it. Give them fruit in their season; such as ripe elderberries, soft pears, roast apple, &c., as in their wild state they begin with the ivy-berries on their arrival in April, and depart in September, after regaling themselves on the Jargonelle pear. I would particularly advise a constant change of food: never keep to one thing, and there will be very few deaths to record. I find it best in winter to turn all the blackcaps together into a large cage, and along with them any other warblers I may happen to have: they are thus warmer and more comfortable, and a large cage gives room for giving them a much larger assortment of food, which may be arranged in small hang-up tins all over the cage near the perches. A blackcap's cage should only be wired in front, and the perches should be covered with green baize. Another advantage attends keeping all the birds together in winter: by seeing each other eat different foods, it is astonishing how they get used to eating food which, if alone, they would not touch. I have known nightingales which would eat nothing but beef and egg, in this manner, by the society of blackcaps and garden warblers, take to feeding on all the above-mentioned foods.

Kendal. J. S. Metcalfe.

ON THE FRUIT OF THE CALAMITE.

The readers of Science-Gossip will remember I promised, at the close of my article on the Calamite, in the September number, 1871, that I would send short descriptions of some of the known plants and fruits of our coal-measures: I shall now try to describe the *supposed* fruit of the Calamite. I say "supposed" because I have reason to doubt that it is the fruit of the Calamite proper, although it is held to be such by Binney, Carruthers, and others: my reason for expressing this doubt I will explain further on.

This fruit is known as *Volkmannia Binneyi*, and is a strobilus: these strobili are found attached in whorls to the nodes of the plant to which they belonged. (See Mr. Carruthers' Lecture "On the Cryptogamic Forests of the Coal Period," delivered at the Royal Institution of Great Britain, April 16, 1869; also Mr. Binney's Monograph, published by the Palæontographical Society, plate 6, fig. 1.)

Those who are conversant with the structure of the fruit of the common "horse-tail" of the present day will see a family likeness between it and the fruit we have now under notice. Yet there is a marked difference between them; for while the former is terminal at the top of the plant, the latter was produced in the whorls at the nodes or joints of the stem or branches. Again, while the former shields its sporangia by simple peltate scales, the latter are protected by additional scales or bracts that pass between the peltate scales and then ascend the outside of the fruit, as seen sketched in fig. 56, *a*.

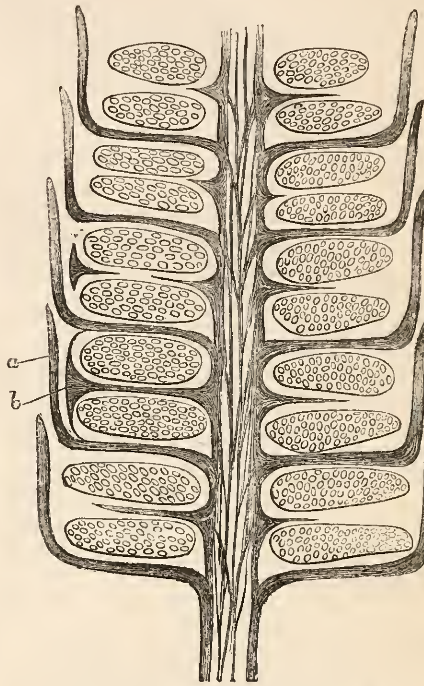

Fig. 56. Vertical section of Fruit of Calamite.

The sporangia are produced from the underside of the peltate scales, as in fig. 56, *b*. There are six of these sporangia-bearing scales in each whorl, and double that number of protecting scales outside them. The central axis or pith of this fruit is of a vascular nature, and the walls of the vessels are barred with transverse striæ. The centre of the fruit is often full of these barred vessels (fig. 57, *a*). It will be seen by reference to the vertical section (fig. 56) that one or two of these vessels are given off and enter each bract at every whorl: the same arrangement is also found in the *strobilus* of *Lepidodendron Harcourtii*. The spores of the fruit under notice are spherical, and appear to have a double cell-wall. I have found no appearance of elaters attached to them, though Mr. Carruthers asserts he has seen them. I have noticed the outer cell-wall broken in many cases, and I am afraid Mr. Carruthers has mistaken this broken outer wall for an elater. I have come across these spores almost in every position, but never could detect the presence of the elaters.

It seems to have been made out by Mr. Binney and other fossil botanists, that all cones or strobili are only altered forms of the branches on which they are borne, and if so, the central axis of the cone must be of a similar form to that of the stem and branch. Mr. Binney has proved this to be the case so far as *Lepidodendron Harcourtii* is concerned;

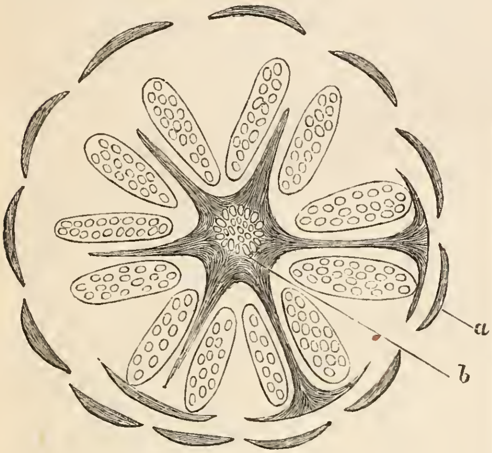

Fig. 57. Transverse section of Fruit of Calamite.

and if it holds good in one instance, we have reason to expect it will do so in others. Now it will be remembered by those who read my former article on the Calamite, that no vascular pith or axis was represented in the sketches I gave. No calamite I have ever yet cut has shown such a vascular pith, and yet we are told that the fruit here described, having a vascular axis, throwing off bundles of vessels to every bract, is the fruit of the Calamite. It may belong to some member of the family of *Calamites*, but I do not believe it belongs to the Calamite I described in my last article.

Two new species of fruit found by myself have been described in recent memoirs of the Manchester Philosophical Society, by Professor W. C. Williamson. The first of these fruit she calls a new form of Calamitean Strobilus, the latter he describes under the name of *Volkmannia Dawsonii*. The first of these answers to the theory laid down by Mr. Binney, and was evidently borne from the end of the stem or branches: it has no vascular axis or pith, but has a hollow woody cylinder with nodes or joints; a thin cellular layer lines this cylinder, as is seen in the stem of a calamite; from the nodes bracts are given off to support the sporangia (the spores are of a peculiar kind, each spore seeming to possess a nucleus), but there are no intermediate protecting bracts, as in the accompanying sketches. The latter cone (*Volkmannia Dawsonii*) is more nearly allied to the one in our sketches, having a vascular pith or centre, giving off bundles of vessels to each bract. It has a great number of sporangia, each sporangium being supported from the base of the bracts by a sporangiophore: its spores are like those of Volkmannia, and are very numerous. For further description of these two last cones, I refer my readers to the "Memoirs of the Manchester Literary and Philosophical Society," third series, vols. iv. and v. JOHN BUTTERWORTH.

Goats, Shaw, near Oldham.

MY AQUARIUM.

A FEW years since I commenced a marine aquarium, and often returned from my rambles on the rocks to place, with boyish pride, the many mingled bright and sober tints of the Smooth Anemone (*Actinia mesembryanthemum*) in a finger-glass or dish, watching with wonder and delight the turquoise-like beads which shone as gems between their waving tentacles.

It would be tedious to trace, step by step, the successive stages which have marked my progress in collecting various specimens; suffice it to say, that I have truly exemplified the Darwinian theory of development with regard to my aquarium: so I think a description of the one I possess at present may prove interesting to may readers of SCIENCE-GOSSIP.

It consists of a bell jar holding about five gallons of water, which, from its gently sloping slides, presents a large surface to the atmosphere. Although generally protected from the direct rays of the sun, I observe that the inner surface of the glass is gradually being covered with algæ, thus obscuring the view; so I clean out* the aquarium, and, as I replace its contents in their proper element, will enumerate the specimens it contains.

I abstract the water by means of a siphon, and then carefully place the varied animal life in a dish. There—now it is quite empty. Having washed off the confervæ with weak acid, I re-fill it with the *same* water that was taken out; I then *suspend*, by means of a float, a large tuft of common green ulva, growing on the back of a dead crab, and throw in a quantity of clean gravel to the depth of about three inches. This falling through the water in a continuous shower, carries with it a considerable amount of air, which naturally rushes to the surface; but being waylaid by the weed, quickly covers it with myriads of globules.

The aquarium is now ready for the reception of the live stock, so I proceed to arrange these with a view to colour, size, habits, &c. Here is a splendid

* If life were properly balanced, this should never require to be done.—ED. S. G.

shell of a Gasteropod, with three fine specimens of the Plumose Anemone (*Actiniloba plumosa*), distributed on its snowy surface and spiny projections. This I place immediately in the centre, so that it appears magnified from every side. I now tunnel a deep groove in the gravel, in which I coil the long and muddy cases of the *Sabella spiralis*, propping the opening with stones, in order that its umbrella-like plumes of spotted brown may contrast with the gay tints of the Plumose.

What strange irregular mass is this? Why, that is the top shell of one of the Lamellibranchiata, and those tubes, like tobacco-pipes, and the leathery sand-cases fixed to it, are the structures of Tubicolidæ. I will place this as a radiation from the centre, and you will soon see the gorgeous branchial tufts of Serpulæ, varying from the purest white and pink to the deepest crimson, from the faintest magenta to the richest purple, slowly expand, mingling with the white and feathery plumes of the smaller Sabella. A circular space, once the resting-place of some large limpet, remains quite bare; on it I will place this fine strawberry anemone, with his richly-spotted surface of yellow and red. Next comes an empty whelk-shell, so elaborately covered with the twisted architecture of serpulæ, that it is very difficult to recognize its form. This is certainly the handsomest specimen I have. The base is literally covered with small tubes, each possessing its beautifully coloured annelid, while, from the centre, six serpulæ of unusual size erect their lime buildings, branching out in semblance of a lady's fan.

Clinging round the orifice of the shell is a fine sample of *Actinia clavata*, or Weymouth Anemone, its white and pink body streaked with warty projections of deeper hue, its long and delicate tentacles of pearly white. Close by its side a small white *crassicornis* displays its short but beautifully transparent tentacula, forming a contrast to the elegant length of *clavata*. And now an oyster-shell claims attention: this is likewise built over by serpulæ, interspersed with small sabellæ. Round the edge are three deep water-daisies, with their beautifully shaded disks of brown and pink; also two delicate *miniata* are seen drooping from an overhanging bunch of serpulæ, their elegant filamentous tentacles sweeping the gravel as they fall from the chequered disks of grey and black. Some time since I had a pretty *Eolis* and a *Doris*, but both died for want of proper food.

This piece of rock will just complete our circle round the centre shell. Besides the numerous serpulæ, I see there is a hillock of polyps—the orange-tinted *Alcyonium digitatum*, and the dirty-looking form of one of the tunicated molluscs. Ah! here is a small and delicate *Ophiura* throwing its long arms over the tubes in search of prey. Wait a moment while I place this obliquely against the glass, for underneath there is the pretty sand and gravel case of the Terebella. I am especially careful as to the position of this, for I like to watch the play of his hydra arms with my hand lens.

Two pieces of coralline (*C. officinalis*), a fine collection of sertularia, the prickly round of *Echinus miliaris*, a gentleman who, by the bye, plays much the same havoc as a hedgehog might be supposed to do, and two grey mullets, complete my stock.

I leave them to recover from their alarm at being disturbed, and when, to-morrow morning, I view them through the crystal water, beautiful indeed will be my miniature garden of the sea. Here gorgeous flowers of prismatic hues will expand beneath a canopy of green, mingling with tinted, waving palms, ever and anon, mimosa-like, closing their petals with lightning speed as some dark shadow falls across the glass, again to unfold their beauteous shapes with graceful motion in the limpid water. There the ever-flowing tendrils of the long-armed hydra twine around the sober shade of larger flowers, or creep in careless, idle sport between the coral arches; while little fish, like silvery birds, cleave the yielding medium, and cause the sea of plumes to wave like grass in summer's breeze. But how softly the gloom of night is closing, hiding the gay vision, only that new beauties may appear. The fairy scene reminds one forcibly of Schleiden's description of the Indian Ocean. A shower of Noctilucæ, fresh dipped from the phosphorescent sea, and gently poured into the aquarium, again illumine the globe. Gaily dancing hither and thither, up and down, scintillating in and out my garden paths, they complete a picture of loveliness beyond my powers of description to portray. If I fail here in describing the view as it appears to the unassisted eye, how shall I attempt to give even a faint idea of the new world which the microscope discovers?

I place a filament of ulva in a watch-glass, and, aided by a good objective, a wondrous vision is unfolded, so full of beauty, so exquisitely adapted to the performance of every function, that wonder changes to the deepest reverence, as thought flies upward to the Great First Cause.

Looking closer we gaze into a green forest teeming with life. Busy "builders" are erecting their homes side by side; all round them are the living flowers—the harebells of my forest, Vorticillidæ—while close at hand, what I may truly term the Victoria Regia—*Stephanoceros Eichornii* — rears its stately crown. Here some active animalcule, bustling and fussy, comes dashing along, right and left, and then off with a jerk to unexplored regions, to be succeeded by others so gentle and graceful, that

"In their very motion there is rest."

Weymouth. WALTER B. COLE.

NEW BOOKS.*

IN the volume which heads our list, we have the result of careful, philosophical, and conscientious thought. Mr. Leifchild has, we think, attempted too much, for the subject is of such a ramifying nature that any work treating of it must necessarily appear diffuse. The author has here grappled with all the leading questions in natural science whose deductions appear to be, or actually are, at variance with revealed religion. He does so in a manner that proves he is at least well acquainted with them,—a qualification that is not always possessed by writers who take his side. Although we differ *toto cœlo* from many of his conclusions, we are happy to afford our testimony to the original thoughts which sparkle in his pages, and to the excellent and attractive English in which they are couched. Like him, we feel that natural science, rightly viewed, is not antagonistic to true religion, whatever it may be to some human dogmas which have associated themselves parasitically with it. But we do not take the extreme view of the materialistic tendencies of the modern philosophy that Mr. Leifchild does. We think that, occasionally, in combating them, he falls into the common error of fighting with giants of his own creation! His chapters on Darwinism are well worked out, and will be read with pleasure even by the most confirmed Darwinian. There we have associated the views of Darwin, Wallace, Spencer, Mivart, Huxley, Beale, and others who have taken sides on this important subject. Still, we think Mr. Leifchild has not thoroughly understood the Darwinian theory as to the formation of species, for he repeats the stock opposition argument about "connecting links" not being forthcoming from the geological deposits; whereas the true naturalist is aware that, compared with the existing fauna and flora, *all* the fossil species are more or less of this nature, both generically and specifically. We agree thoroughly with the author that "Evolution demands an Evolver," but we demur to purely scientific questions being treated on theological, instead of on scientific grounds. To whatever conclusions our researches may lead, we are bound honestly to follow them if they be but true! We have no right to dictate beforehand the only paths along which scientific thought may travel. Having spoken thus candidly of a book which cannot fail to impress the reader as the product of no ordinary mind, we leave it to make its undoubted mark.

Of Dr. Porter's address, here published, we can say little, and that little not altogether favourable. After a careful reading through, we have not felt impressed by any part, except that devoted to a strong, almost violent, tirade against Herbert Spencer's philosophy, which he tells us "will soon cease to be the wonder of the hour." Of Spencer he pityingly adds, that "he will suffer a more complete neglect than he will fairly deserve." Our acquaintance with Spencer's writings leads us to conclude that Dr. Porter has not yet risen to the stage of fairly comprehending them. Addresses like these must injure the cause advocated far more than anything else.

It is gratifying to get on the ground of pure scientific research, as we do when we come to Dr. Spencer Cobbold's work on Practical Helminthology. That gentleman has elevated a study both repulsive and disgusting, into one at once attractive, philanthropically useful, and important. The book before us is the result of a course of lectures delivered on worms at the Medical College of the Middlesex Hospital, and deals pretty fully with all those forms of internal parasitism which ordinarily come under the notice of the physician, together with a list of cases illustrating the symptoms, diagnosis, and treatment of internal parasitic diseases.

The last book on our list is not connected with the sciences to which the pages of Science-Gossip are devoted, but we can recommend it, especially for the number and value of its illustrations. It is a translation, with additions, by Professor Everett, of Deschanel's work.

* "The Higher Ministry of Nature viewed in the Light of Modern Science." By John R. Leifchild, M.A. London: Stodder & Houghton, 1872.

"Science and Humanity." By Dr. Porter, President of Yale College. London: Stodder & Houghton. 1872.

"Worms," a series of Lectures on Practical Helminthology. By Dr. Spencer Cobbold, F.R.S. London: J. & A. Churchill. 1872.

"Elementary Treatise on Natural Philosophy." By Professor Everett. London: Blackie & Son. 1872.

SKETCHES IN THE WEST OF IRELAND.

By G. H. K.

Introductory Remarks.

IRELAND is only a few hours' sail from either England or Scotland, but it seems to be a greater *terra incognita* to the inhabitants of Great Britain than Europe, Asia, Africa, America, or even Australia; yet in this island there are places worthy of being visited and explored; and in these sketches it is proposed to call attention to some of them.

To the natives of the sister isle, one of the most unknown parts of Ireland is the barony of Burren, county Clare, lying on the Atlantic Ocean, and bounded on the north by Galway Bay (fig. 58). In this area there is a peculiar botany; the rocks also are remarkable, while the county teems with megalithic and other ancient structures.

Fig. 58. Terraced Hills of the Burren, as seen from the north of Galway Bay.

The rocks in this part of Clare are principally of upper carboniferous limestone age; there are, however, in places, outlying patches of the lower coal-measure shales, while to the south and south-west the limestone disappears under these newer rocks. These latter, hereafter, will be more fully described, and a few words may now be said about the limestone,—the rock *par excellence* of "the Burren"* (*anglicè*, a stony or rocky district). Here the carboniferous limestone, contrary to its general Irish character, forms hills and mountain groups, both strange and unique in outline and aspect, as the sides of the hills, valleys, glens, and passes consist of huge nearly horizontal steps, continuous for miles (fig. 59) round the hills, up and down the valley, in and out of the cooms, and in fact everywhere forming a universal character of the country. These everlasting rocks give the hills a most barren and poverty-stricken aspect; yet the country is far from deserving such a character. A stranger, looking over a vast tract, sees nothing but grey, cold rock, with loose stone walls intersecting it here and there; but what will astonish him most will be a herd of large heavy cattle enjoying themselves, apparently on a diet of limestone. If, however, the crags are traversed, he will find that all the cracks and crannies are full of most luxuriant herbage, on which the cattle browse, the great drawback to the pasture being a scarcity of water. On account of the nature of the rock, all water that falls, percolates the mass, and would entirely disappear but for a few shale partings and chert layers between the nearly horizontal beds, that stop its descent; thereby bringing it out as springs in different places. This water is so valuable, that from time immemorial rectangular troughs have been excavated in the thick beds of limestone as storage-cisterns for the surplus.

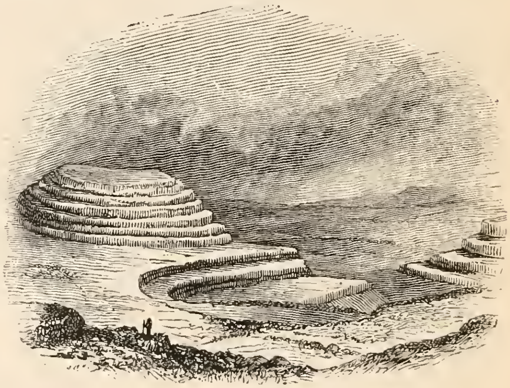

Fig. 59. Terraced Hills, Glen Colombkill.

The country, however, is used more for winter than summer pasturage, not only on account of the small water-supply, but also as the climate is so mild, that cattle do not require houses during the winter months, while they increase rather than diminish in flesh: even in the old annals we read of the fat cattle from the Burren.* This country, therefore, is a favourite winterage for the cattle belonging to the extensive stock-owners of South Galway and other places.

The Burren may be approached from the north, south, or east; the latter, however, in these railway times, seems to be the best route, besides having the advantage of prominently and abruptly bringing the traveller into contact with its wild and picturesque

* This rock in England is commonly known as "mountain limestone." In Ireland, however, except in Queen's county, Clare, and county Sligo, it generally forms a low undulating country, occupying the great central plain.

* Ten hundred oxen from Burren was part of the tribute of Cashel to the kings of Erin.

scenery, as he drives or walks from Gort, a small town and station on the Athenay and Ennis Railway. Previous, however, to leaving Gort, some time might profitably be spent in exploring the natural curiosities in its neighbourhood; their description, however, may form the subject of the first chapter.

PECULIAR TROUT OF LOCH ISLAY.

By Jas. Thomson, F.G.S.

On the S.E. side of the island of Islay, in the neighbourhood of McArthur's Head, and extending inland for several miles to the west, there extend a series of bold conical quartzite hills. The highest of these is 1,600 feet above the level of the sea. Situated in the interstices of these hills are numerous tarns, or small lochs. In one of those lochs occur trout with abnormally-formed caudal fins. The loch is known in the island by the name of Loch-Na-Maorichen (Gælic), which means, in English, the "Shelly Loch;" it lies on the western extremity of a plateau about a mile in breadth, and 900 feet above sea-level. It is bounded on the east by Ben Vigar, 1,600 feet above sea-level; on the south by Ben Urrara, 1,400 feet above sea-level; and by Ben Van, about 1,200 feet above sea-level; while to the west there is a gradual descent to the sea, which is about seven miles distant. The surrounding of the plateau is in outline like an amphitheatre on a grand scale.

Ten hundred and forty-four yards to the east of Loch-Na-Maorichen, at the base of the hills, there is another loch, called Loch-Na-Breac (signifying, in English, "Trout Loch)," which is about 100 feet above the level of Loch-Na-Maorichen. This is a deep, broad sheet of water, and is surrounded by a ridge of quartzite rock, varying from 30 to 60 feet in height, and forming a complete barrier between it and Loch-Na-Maorichen. This loch abounds with small trout having the usually formed homocercal caudal fins. The surplus water is carried away by a small runnel on the north side of the loch, and flows down the valley on the north side of Loch-Na-Maorichen, about 150 feet below the level of the latter, joining the Lerggen stream two miles further down the valley.

To the south, and at a considerably lower level, are several small lochs, in which no fish have been found during the last thirty years. One of these, Loch Urrara, is a dark, deep sheet of water, and has been many times fished, but in no instance have any fish been caught. Loch-Na-Maorichen is 250 feet long by 234 feet broad, and is surrounded by a ridge of quartzite rock, which on the west is 60 feet, on the north and east 30 feet, and on the south 10 feet above its level. On the N.E. there is a small runnel 15 inches broad, and from 18 to a few inches deep. This outlet is partially filled with water for a distance of 48 feet, where it is finally lost to view. In descending the valley, there is evidence of an old watercourse, which can be traced down to the burn that carries away the surplus water from Loch-Na-Breac. This old watercourse is well filled up with peat moss and surface vegetation, while the surplus water, in rainy seasons, can only be seen oozing through the moss. It will be apparent that there is now no connection between Loch-Na-Maorichen and any other sheet or watercourse.

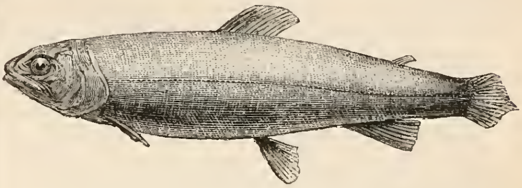

Fig. 60.
Peculiar Trout of Loch Islay. Var. *a*, Acuminate tail.

On the south side of the loch there is evidence of a second outlet, in the form of an elongated depression, the bottom of which is covered by angular fragments and masses of quartzite, similar to what we now find around the south-eastern margin of the loch; but at present this outlet is fully six feet above the level of the water in the loch. In and surrounding the south-east margin of the loch, an area is covered with angular fragments and boulders of quartzite rock. The surface of these stones is dotted with numerous little black oblong spots, which, when examined, are found to contain the larvæ of the little dark flies so frequently found moving about under the banks and sheltered places of pools and streams.

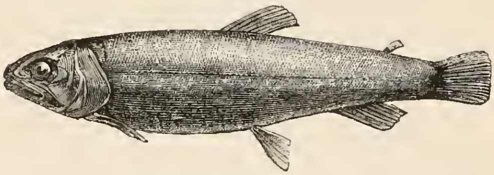

Fig. 61. Peculiar Trout of Loch Islay. Var. *b*, Rounded tail.

It has been asserted that the fish found in this loch feed upon small shells. Possibly this may have arisen from its name, which, as before stated, means "Shelly Loch." If there have been shells in it, it must have been a long time ago, possibly during the earlier part of the post-tertiary age, as there is not the slightest trace of shells in the loch now. This is testified by the contents of the stomachs of the fish, four of which I have carefully examined, and found to contain the larvæ of insects, flies, and several small fresh-water beetles. In some of the stomachs were flies, larvæ, &c., all more or less mixed with fragments of vegetable matter; the only form of the latter distinguishable was an alga, *Bulbochæta setigera*. The trout of this loch differ from the fish found in other lochs in Islay, in the form of their heads and caudal fins. In other respects they possess the usual characteristics of loch trout. In colour they are yellowish-brown, with red and dark brown spots interspersed over the body and dorsal fins. The ventrals and anals are formed as in other trout, and are perfect to the apex, the rays tapering off to the most delicate film. The pectorals are in no way eroded or effaced. The caudal fins, however, are not bifurcated, but are all more or less rounded. Some varieties are acuminate in the centre (fig. 60), the rays measuring only $\frac{1}{8}$ of an inch from their base to the apex. The variety whose caudal fins are rounded (fig. 61), terminate more abruptly than the acuminate form, and are covered at the apex with a thick succulent skin. Some naturalists have suggested the possibility of friction having produced these abnormal forms of the caudal fins. This opinion I cannot for a moment entertain, for, if friction had produced it, we should expect that the rays of the pectoral, ventral, and anal fins would all be more or less worn as well. This, however, in no instance have I found; all are perfectly preserved, and, as before stated, are seen tapering to the most delicate point. Further, if friction was the cause, we should naturally expect to find similar forms in some of the lochs in the immediate neighbourhood. This, however, has in no instance been done. Mr. McKinzie, a keen sportsman, has fished the lochs in this part of the island for thirty years, and has in no instance found a single fish formed like those found in this particular loch. During that time he has never found a single fish in Loch-Na-Maorichen whose caudal fins were not of this abnormal shape. This variety being restricted to this particular loch, and the physical conditions being similar to some of the other lochs in the district, I cannot see how friction could be the producing cause. These fish differ also in the form of the head, which is shorter, and more especially in the proportion from the orbits to the point of the snout, which is more obtuse than in the ordinary trout. It more resembles the bull-trout, and seems to form an interesting variety of *Salmo eriox*, or "bull-trout." I would suggest as a fitting name for this variety, *Salmo Islayensis*. I leave to others the interesting task of accounting for the origin of such a distinct variety of fish, whose abnormally-marked variations must be advantageous, or it could not have excluded the ordinary form, and maintained possession of this isolated sheet of water.

"Humboldt relates, that on the banks of the Orinoco he saw a parroquet a hundred years old, which spoke in an unknown and extinct tongue."

BATS.

In "G. M. M.'s" notes on these interesting little mammals on page 18, he says, "Who can tell where they hide themselves during the day and throughout the winter?" Both of these questions I can readily answer. During the pulling-down of part of these premises several years back, many bats were found hid away in all sorts of holes and crannies. Bats also retire after their nocturnal flights to chimneys, old masonry, caves, and hollow trees. The eaves of large buildings are also a favourite rendezvous for all kinds of bats. In an old work on quadrupeds I have at my elbow, mention is made of a bat-hunt during three successive days under the eaves of Queen's College, Cambridge. The first day one hundred and eighty-five were taken, the second sixty-three, and the third two. They were all of the high-flying species known as the Noctule or Great Bat (*Noctulina altivolans*), and each measured fifteen inches in extent of wing. Have any readers of Science-Gossip noticed with what adroitness a caged bat will make its escape through any convenient crevice, and how easily it manages to squeeze itself through almost impossible apertures? Last September, when about retiring to rest, word was brought me that one of these ghostly creatures had taken possession of a bedroom intended for a couple of individuals higher in the scale of beings than the intruder; and would I kindly assist in returning the latter to the "realms of air"? I went, and there sure enough was the terrible, hobgoblin-like creature flitting round the room like a departed spirit, and flapping its leathern wings in appalling proximity to the four-poster. What was to be done? It was highly absurd to think of occupying the room while this dreadful spectre was flapping its ghostly wings above the bed. Various likely and unlikely means of inducing the creature to make its exit were tried, but all with the same success,— that is, none. At length the fertile imagination of the humble penner of these lines suggested an attempt to net him with his companion in many a long entomological ramble —to wit, a butterfly-net. The net was brought, adjusted on the stick, and a valiant charge made at the ill-omened intruder. After spinning round and round like a teetotum for some time, and making vain dives at the apparition, a dexterous turn of the wrist brought the opening of the net in a line with *Plecotus communis*, and the game was triumphantly bagged. I put my member of the cheiroptera into an old birdcage, stuffed up every likely means of egress, and left it for the night. I went early next morning to look at my prisoner; but he had "broke the jug" *à la* Jack Sheppard, and skedaddled no one knows where, for I have never popped eyes on my midnight visitor since. He must have squeezed himself through wires not half an inch apart. Several others of my bat-pets have evaporated in the same mysterious manner. The Bat in frosty weather remains at home and hybernates till a milder temperature prevails. Some years back I found a Long-eared Bat (*Plecotus communis*) hybernating in the cellar of this house in winter. His membranous wings were closely folded round his body, his beautiful semi-transparent ears nicely tucked away, and his little bead-like eyes wrapped in profound sleep. It was rather puzzling to me how the little fellow could snooze away so soundly situated as he was, for his head hung where one would be apt to look for his tail under ordinary circumstances. His dreams—if bats dream at all—must have been full of surprising adventures in such a night-marish and apoplectic position. To sleep with the head downwards is, however, as natural to the Bat as a horizontal posture is to us. The Bat is but a partial hybernator, and only disappears in frosty weather. Every mild evening during the present winter the Bat has been flitting about in front of this house in quest of the few gnats and other small insects which gambol about in winter. Occasionally he is imprudent enough to venture out in frosty weather, and then he often pays dearly for his temerity. I once had a bat brought me which had ventured forth from its retreat one sharp frosty night, and had been picked up more dead than alive. It is probable that it had chosen too warm a nook for its retreat, which, unaffected by the weather, had caused the little animal to imagine that a similar genial temperature was prevailing without. After feeling the warmth of the fire for a short time, it revived and flew round and round the room, and when tired suspended itself head-downwards from a flowerpot. WILLIAM HENRY WARNER.

Kingston, Abingdon.

MICROSCOPY.

PASTE EELS.—My directions for procuring paste eels ought perhaps to have concluded, after the manner of old-fashioned recipes, with *probatum est*. The directions are according to those I received from that veteran microscopist Pritchard, the author of the "Infusoria, &c." Is Mr. Nicholson quite satisfied that spontaneous generation is a fallacy, and that the experiments of Dr. Bastian and others prove the contrary? Has Mr. Nicholson ever made any experiments with various infusions, or has he ever found the "eels" in what is called "mothery" vinegar, or the fungoid growths on paste or preserves, or the mycelium developed in distilled water, even when kept in closely-stopped bottles, or a similar growth in the interior surfaces of dry moulded slides? Does Mr. Nicholson seriously say these forms would not have appeared if the spores or germs had not been placed there intentionally? I must, however, ask him where he finds in my note any assertion that these eels are spontaneously generated? I only stated that these forms would be found in paste, if certain directions were followed. I am inclined to imagine that they, like Bacteria, Vibriones, and moulds, are produced from germs floating in the air or existing previously in the flour. Possibly the *Anguillula glutinis* is the same as *A. tritici*, although it is stated that the former is more energetic than *A. tritici*. Dr. Carpenter states that paste eels frequently make their appearance spontaneously in the midst of paste that is turning sour, in other words, when acetous fermentation has commenced. This would lead to the inference that *A. aceti* was also identical with *A. tritici* and *A. glutinis*. Perhaps Mr. Nicholson will favour the readers of SCIENCE-GOSSIP with his method of obtaining a supply of anguillulæ without first putting them into the paste. I suppose he is not prepared to assert that portions of paste containing these forms have been successively handed down by the discoverer from one observer to another—in fact a kind of apostolic succession.—*F. K.*

ON THE MOBILITY OF SPINES ON CERTAIN INSECTS' EGGS.—In a paper by Mr. H. Davies F.R.M.S., communicated to the Quekett Club, the author states his observations on the spinous processes found on the eggs of certain parasites, particularly those of the black-quilled Peacock and the Mallee-bird. He observed on the former, that the curved petaloid spines rapidly uncurl, straighten and contract on the lid when the egg is placed under water. They remain thus closed until the egg becomes dry by evaporation, when the spines loosen, then gradually and gracefully recurve until the egg assumes its flower-like form. A group of these eggs in drying makes a pretty sight in the microscope. The author suggests the probability that the spines contract over the lid in wet weather, and thus restrain the hatching of even mature eggs until the weather is more favourable.

SECTIONS OF COAL.—Mr. J. Slade (in Proceedings of the Quekett Club) gives the following directions for the preparation of sections of this material:—A piece of coal being selected, a surface is at first obtained roughly by a file or a piece of sandstone, then a finer by means of a hone or a piece of fine glass-paper, then a still finer by means of pumice-stone, and, after rubbing upon Arkansas stone, finally brought to the highest polish possible by friction upon plate glass. If the coal be very friable (which it sometimes is), it will be necessary to macerate the specimen in thin lac varnish, and dry it, before the whole process can be accomplished. In order to secure success, it is impossible to bestow too much pains in this preliminary operation. Having made a good surface, next cement it to a glass slip by marine glue. The marine glue requires careful selection, as the glue usually sold contains particles of the undissolved materials, which are visible under the microscope. However, having obtained the right sort, cut thin slices, lay them upon the glass and melt over a flame; when thoroughly melted, drop the specimen (the polished surface being downwards) into it, and press out the air-bubbles. When the air-bubbles appear between the glass and the polished surface, they must be got rid of, otherwise it is useless to proceed; for long before the specimen is thin enough to show structure, the coal over the air-bubble comes away, leaving a hole. If they be not present, the preparation may be proceeded with, first reducing it on sandstone, and then finishing it with pumice-stone; and after scraping away the superfluous marine glue, mounting in Canada balsam and covering in the usual way. As the grinding goes on, it must be frequently examined under the microscope. The first to appear will be the spore-cases, and a careful continuance of the grinding will finally render the spores visible. Spores and spore-cases are to be found in every successful preparation of coal; but their relative proportions and degrees of preservation vary considerably; thus Wigan cannel almost entirely consists of spores, very few spore-cases; Bradford coal, spores and spore-cases in nearly equal proportions; Silkstone coal, spore-cases few and much compressed, spores in abundance; Moira coal, Leicestershire, spore-cases beautifully preserved, and in some spores *in situ*; while coal of Australia consists almost entirely of spore-cases. [The impurities in the marine glue may be separated from it by tying it in a piece of linen or flannel, immersing it in hot water, and squeezing it with a piece of wood.]—*F. K.*

A Hint to Microscopists.—I would suggest to those who are seeking entomological objects, that the empty pupa-cases of butterflies and moths would be found to furnish some nice slides. Small portions of the envelopes which encase the antennæ and legs could be exhibited in their entire state; of the shell which wraps over the wings and body, sections might be mounted as opaque objects, or, in many instances, I should think, thin slices would be found to be transparent. But the student must not suppose, should he chance to find one of the pupæ or chrysalids which are bespangled with metallic markings, that when the insect within has emerged he will get a splendid slide therefrom, for these disappear when the case has lost its tenant.—*J. R. S. C.*

"In the presence of the Alps, no worldly authority can preserve its lying prestige; the only sovereignty which there exists is that of reason, truth, and conscience."—"*The Mountain,*" *from the French of Michelet.*

ZOOLOGY.

Blind Fishes.—In the February number of the *American Naturalist*, Professor Putnam adds an important fact to his interesting paper on the above subject, obtained from Dr. Hartring. He states that a specimen of one of the blind fish, *Typhlichthys*, was placed in a jar of spirits, when shortly afterwards eight young fish were observed. Their birth was due to the sudden immersion in alcohol. When these young fish were examined with a magnifying-glass, they were seen to be totally deprived of eyes! It will be remembered that in the adult state these fish had their eyes aborted.

Parasite on Pieris Rapæ (the small Cabbage Butterfly) in Canada.*—The news of the appearance of an effective parasite on *P. Rapæ* will, we doubt not, be hailed with delight by our Lower Canadian friends and the gardeners of the North-Eastern States. Mr. P. S. Sprague, of Boston, Massachusetts, has kindly sent us several specimens of both sexes of this new arrival, respecting which he writes as follows:—"The *P. Rapæ* chrysalis parasite proves, on examination by Dr. Packard, to be the introduced *Pteromalus puparum*. My son gathered about fifty of the chrysalids, every one of which was infested, as many as forty specimens coming from a single one. The female walks over the chrysalis, feeling with her antennæ for a suitable place to insert her ovipositor, and when found, drills a hole, which takes upon an average one minute in time." The following excellent communication by Mr. Sprague's son, who bids fair to become an eminent entomologist, we copy from the *Rural New Yorker*. "A new Enemy to the Cabbage-worm:—Although I am a little boy, I think I can write something which will please the old folks. Almost everybody who raises cabbages has had a great many destroyed this year by a little green caterpillar, and I suppose they have seen a new white butterfly, called the *Pieris Rapæ*, flying round them. This butterfly lays a little white egg on the leaves, which in a few days hatches out a little green caterpillar, which eats until it grows about an inch in length; then it goes and hunts up some sheltered place where it can go into a chrysalis. I was looking for some chrysalids for my father, when I saw a little fly walking all over them; by-and-by it made a little hole in the chrysalis to lay its eggs in. This fly is almost one eighth of an inch long; it is of a golden colour. Some of the flies have yellow legs and others have dark ones; they have four wings; the body is pointed at the end: there are about fifty of these flies in a chrysalis. The chrysalis looks as if it were all right; but if you

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* This pest was introduced into Canada from Europe a few years ago, and has multiplied so rapidly as to have become already a source of serious uneasiness.—Ed. S.-G.

break it open, you will find it full of little grubs. This little fly kills so many of the chrysalids that in a few years the butterflies will not be so common, and cabbages will not be destroyed.—*H. W. S., Boston, Mass." From the " Canadian Entomologist," December*, 1871.

Deep-sea Dredging.—Professor Agassiz has addressed a letter to a friend on this interesting subject, in which he recapitulates the various forms of organic life which may be expected to be discovered still living in the deeper and still unexplored parts of the sea-bottom. The principles upon which he bases his prognostications are that there is a correlation between the grades of animals in the complication of their structure, their order of succession in geological times, their mode of development from the egg, and their geographical distribution upon the surface of the globe.

The Tapir.—The British Museum has received a series of specimens, of different ages, of *Tapirus villosus*, from the Cordilleras of Ecuador. The adult male is black, closely covered with rather short hair; the young is covered with abundance of longer hairs. The young is also marked with broad grey streaks, more or less confluent, or united into short grey lines. The nasal bone of the adult is elongate.

Why Butterflies and Moths are scarce after a damp winter.—The circumstance that a cold and dry winter is more favourable to the development of lepidopterous insects than a mild and wet one has been variously explained; and there is no doubt that several causes are concerned in it. The effects of excessive moisture upon pupæ, it has been already noted, are decidedly unfavourable, and kill many which would defy severe frost and its accompanying dryness. Mildness in the winter season is harmful to a certain portion of the hybernating caterpillars. It is the general habit of some of these to feed through the winter at intervals, and others remain almost invariably quiescent, waiting for the development of vegetable life in spring. These latter are roused from their torpor by an unseasonable geniality. They seem to require food, but, in some cases, there is none to be had appropriate for them; and they often die from inanition, or are killed by some change of the weather. Eggs also, which should remain unhatched until March and April supplied the leaves needed by the larvæ, are developed into life in February, or even in January, and the result is necessarily the death of the particular broods. So that, looking at the matter from a horticultural point of view, the gardener, if he grumbles for some reasons at a wet and mild winter, has also reason for satisfaction thereat, in the probable diminution of the number of caterpillars which will annoy him in the following summer.—*J. R. S. C.*

BOTANY.

Insect Fertilization.—A whole acre of mignonette would not emit more perfume than a single plant of the Fan Palm of the Rio Negro (*Mauritia carará*). In approaching one of these plants through the thick forest, the sense of hearing would, perhaps, give the first notice of its proximity, from the merry hum of winged insects which its scented flowers had drawn together to feast on the honey, and to transport the pollen of the male to the female plants; for it is chiefly diœcious species of palms that have such sweet flowers. The absence of odoriferous flowers from the grasses seems to show that insect aid is not needed for effecting their fecundation, but does not render its accidental concurrence a whit less unlikely. If the flowers of the grasses be sometimes fertilized in the bud, it is probably exceptional, like the similar cases recorded of orchids, and many other families.—*A. Spruce.*

Peculiarities in the Dock.—Being an ardent lover of wild flowers, and something of a botanist, I venture to think that a few details of my botanical experience may not prove uninteresting to your readers. During the last two summers I have given my attention to a group of plants which I had hitherto entirely disregarded as too uninteresting to be worth more than a glance; but as I had set myself the task of making coloured drawings of all the wild flowers I could meet with, and having transferred to the pages of my book of "Wild Flowers" all the more attractive flowers in my neighbourhood, I could no longer neglect this hitherto despised tribe, the Dock (*Rumex*). I therefore set to work at them; but to draw them was no easy task, and to name them, when drawn, still harder. The varieties seemed endless, no two specimens appeared exactly alike; and when I thought I had decided on the name of a species, I could not satisfy myself the next day that I was right. When I mention my difficulties more specifically, perhaps those who best deserve the title of botanists will acknowledge that these difficulties *do* exist, and those who are only students and beginners may find these difficulties lessened for them if I relate as briefly as I can the course and result of my own observations. When we turn to any botanical work and look at the descriptions given of any species of the tribe Rumex, we find that the tubercles on the petals are a very distinctive feature of the plant; but in no botanical work that I am acquainted with have I found any remark in reference to what stage of the flowering process the tubercle is developed. I venture, therefore, to offer my own experience and observations made on this point. In the early part of July I found a very fine specimen of one of the water-docks on the edge of the river Stour, within half a mile of Blandford, a small town in Dorsetshire. I had never before seen either of the water-docks, and was uncertain which of them I had found. There being only this one plant—a very fine one, I was careful to gather only a small piece, and made a drawing of it: it was then in full bloom; the anthers, covered with pollen, were protruding beyond the petals, which were totally devoid of tubercles. I visited the same plant again about three weeks later, and not a tubercle was to be seen, but here and there, on a very few of the petals, was something like a brown skin. I took this piece to a friend who had a powerful microscope. He submitted these brown-skinned petals to a close investigation, but could only describe them as an irritation on some of the petals. Whatever they might be, they were very rare on the plant. After a careful examination, we decided that there were no tubercles, and agreed that the plant must be *Rumex aquaticus*, the Grainless Water-dock. I thought this point settled, when, about three or four weeks later I again visited my dock, what was my surprise to find each petal bearing a large tubercle, very much raised in appearance, like white beads tinged with pink, the whole appearance of the plant being totally altered. I made a drawing of my dock in its tubercled state and named it *Rumex hydrolapathum*, there being now not the least doubt as to its proper nomenclature. The point I wish to make evident is the length of time that had elapsed from the first flowering of the plant to the development of the tubercles, at least six weeks, which is a difficulty an unexperienced botanist like myself is totally unprepared for. I also observed closely *R. crispus* and *R. obtusifolius*, and found that in both plants the tubercles were not developed till after the flowering of the plant. As far as my observations went, I came to the conclusion that no tubercles are developed till after the anthers and pollen have disappeared. I think also that in many of the species the teeth are not developed till a late stage of the flowering of the plant. I shall be glad if any botanists will furnish me with their experience on this point. Another difficulty arises from the discrepancy in the descriptions given by various botanists. Sowerby, in "British Wild Flowers," describes *R. crispus* as having only one tubercle; Withering, whose descriptions I have generally found the most accurate, says of the same plant, "petals all bearing a tubercle." Lindley says, all bearing very large tubercles. Withering has no *R. pratensis* at all.—*F. M. K.*

New Fungi.—Mr. T. Britton, of Manchester, who is well known as a botanist, has recently added two new species to our British flora. One is a fungus found on the Butter-bur (*Petasites vulgaris*), and named *Badhamia capsulifera*, B., which Mr. M. C. Cooke has declared to be new to our flora. The other was found at Chelford, in Cheshire, during Christmas week, and is also new. Mr. Phillips, of Shrewsbury, has identified it as *Perichæna quercina*, F.

GEOLOGY.

Fossil Horses.—At a recent meeting of the Californian Academy of Sciences, it was stated by Professor Marsh, of Yale College, that in the Miocene and Pliocene deposits of East Oregon a large number of species of fossil horses had been discovered. Among them was one only two feet in height. Others of the two-toed type had also been collected.

Fossil Fish in Palestine.—On reading a paper in the January number of Science-Gossip on "Science in the Tenth and Twelfth Centuries," I was reminded of a passage in Joinville's "Histoire de Saint Louis" which may prove interesting to geological readers, as showing the simple childlike wonder with which fossils were regarded in the thirteenth century. While recounting the events of the Seventh Crusade, which took place in 1248, the good knight pauses to remark, in his quaint way, how, "tandis que le roy estoit a Sayette, li apporta l'en une pierre qui se levoit par escales, la plus merveilleuse du monde; car quant l'en levoit une escale, l'en trouvoit entre les deux pierres la forme d'un poisson de mer. La pierre estoit le poisson; mais il ne failloit riens en sa fourme, ne yex, ne ariste, ne couleur ne autre chose que il ne feust autre tel comme s'il feust vif. Le roi manda une pierre, et trouva une tanche dedans, de brune coleur et de tel façon comme tanche doit estre."—"While the king was at Sayette [Sidon] a stone was brought to him which was formed in layers, the most wonderful stone in the world, for when a layer was raised, there was found between the two stones the form of a sea-fish. The fish was of stone; but nothing was wanting in its form, neither eyes, nor bones, nor colour, nor any other thing, which was not just as it would be if it were alive. The king sent for a stone, and found a tench within, of a brown colour, and of such fashion as a tench ought to be." I presume that there can be no doubt that some kind of fossil fish is here alluded to; and I am curious to know whether there is modern testimony to prove that fossils of a similar kind are still to be found in the neighbourhood.—*G. F. Warner.*

Fossil Hydrozoa (p. 67).—The comparative rarity of fossil Hydrozoa may be partly due to the perishable nature of many of the organisms constituting this class. None of the oceanic Hydrozoa seem capable of preservation in a fossil state; but the Hydroida are well represented in Palæozoic rocks, though, if we except the Medusoid impression said to have been observed by Professor Agassiz in the Oolitic lithographic slate of Solenhofen, they appear to be absent in rocks of more recent age. The Athecata, or Tubularian zoophytes, are represented in a fossil state by the Silurian genus *Corynoides* and the Carboniferous genus *Palæocoryne*, and the Thecaphora, or Sertularians, by the Silurian genera *Dendrograptus* and *Ptilograptus*, and probably, also, *Callograptus* and *Dictyonema*. Then there are the Rhabdophora or Graptolites, an entirely extinct sub-order of the Hydroida, found *exclusively* in Silurian rocks, and consisting of sixteen genera, with nearly ten times as many species. The Hydrozoa are thus represented in Palæozoic rocks by at least twenty genera and from about 180 to 200 species of hydroid zoophytes.—*J. Hopkinson.*

NOTES AND QUERIES.

Dried Flowers.—From what Mrs. Watney has written to Science-Gossip last month, I have ventured to hope that, with the editor's kind permission, a few words on the subject of an amateur *Hortus siccus* may not be unwelcome to some of its readers. Of course to the botanical student, a *Hortus siccus* has an extensive signification, and brings with it visions of volumes of brown paper, and large collections of withered plants, and hard Latin names. Now, to an amateur who has plenty of leisure, all this might be changed, and knowledge be gilded over by beauty's magic wand. I think one of the most charming occupations in which one can indulge during a summer vacation is the study of Nature. I have had some little experience in preparing plants for the little cards to which Mrs. Watney alludes; and, some six years ago, when my father had the honour of contributing to the pages of Science-Gossip, we had several elegant wreaths and bouquets of wild and exotic flowers on card-board. The *modus operandi* of preparing the blooms, leaves, &c., is simple enough, care and attention only being required as to the time of gathering them, and the delicate manipulation whilst preparing and fixing them on the cards. Whilst visiting the Channel Islands, some of our most richly-coloured and handsome wreaths were made, but nothing, in my idea, could rival the spring blossoms and wild flowers found near our Dorset home, in the lanes and on the downs. One collection of single violets, purple and white, intermixed with feather mosses (*Hypnum trichomanoides* and *H. rufescens*), with a few violet-leaves, and a frond or two of fern, was a particular favourite of mine: they were gathered and mounted in 1859, and for years kept their freshness and colour. The best time for plucking the blooms, leaves, and especially ferns, is when they are ripe, *i.e.* in their prime. Immature petals and leaves are apt to droop and fade before there is time to bring them home and press them. Bright, warm, dry days are the best to select for botanic excursions. Having collected the quantity and variety required for a wreath or bouquet, whilst they are yet fresh, take some good pink blotting-paper, fold it to the size of an ordinarily large book, place the flowers carefully between the leaves, so that the blooms may be kept in as perfect a form as possible. Take for an example the simple little primrose; separate the bloom from the stalk, and, on laying it down on the paper, the amateur will find some little trouble in fixing it for pressing so as to preserve the symmetry of the flower. Having arranged the subjects at proper distances, place the blotting-paper under some large books, and put heavy weights upon it. Should the collection not be made all at once, the leaves and blooms will keep in this way well for a month or so, and they should be exposed as little as possible to the light till mounted. A week or ten days will suffice in an ordinary way to press the subjects. When they are sufficiently dry for mounting, select some white Bristol board, arrange the design intended to be formed, then fix them to the card-board with liquid gum. The same instruments may be used as in mounting seaweeds for the smaller and more delicate blooms. When completely grouped, place them again under pressure, and leave until quite dry; then take out the card-board, and varnish or not. Any one who may take the trouble to form one of these very lovely natural pictures, will be more than repaid for the time expended in preparing it. Would not an album (say like a photographic album) filled with little cards tastily arranged with specimens of local floras, mounted in the way I have now described, be a pleasant and pretty *souvenir* of summer holidays, having the Latin names, and the locality the specimens were found in, together with the date, inscribed on the back of the card, or on the margin? I see some of the correspondents to Science-Gossip are writing on the subject of Poisoning Dried Plants. I have now a collection of plants gathered by my father whilst a student at the Edinburgh University in 1839, and they were simply pressed and kept between coarse blue paper.—*Barbara Wallace Fyfe, Nottingham.*

Glowworms.—Mr. T. Buck, Chelmsford, wishes to know how to catch male glowworms. Let him put a lamp or candle in an open window when the females are shining, and he will have as many as are about.—*C. Kingsley.*

Glowworms.—I think if your correspondent Mr. Buck will go with a lighted lamp or lantern, some warm dark night in June or July, into the woods or lanes where the glowworms abound, he will have no difficulty in getting males. I used to find them a nuisance rather than otherwise when "sugaring" in the woods in the South of England. They flew in my face, settled on my coat-collar, waistcoat, and whiskers, and were especially fond of perching on the edge of the rim of my hat.—*C.G.B.*

Male Glowworms (page 68).—In reply to Mr. Buck, I may state that the male beetles are not to be found during the day, nor so readily at the evening dusk, as are the females. When the night is further advanced, however, they fly abroad briskly, and as the pages of various magazines testify, have frequently been mistaken for fire-flies. In and about woods are favourite resorts, and they have been noticed dashing to and fro near the lanterns carried by entomologists engaged in moth-hunting. Regarding the longevity of the insect in confinement, I may add that I am aware of one instance where some females were brought into a house and allowed to wander away. All disappeared but one, and that turned up some five or six months after, alive and luminous, in some odd corner, very much to the surprise of the inmates. How it had kept itself alive no one could tell.—*J. R. S. C.*

Chameleons.—These reptiles, being the natives of very warm climates, require a vast amount of care when brought over to England, and it is but rarely that we hear of a pet chameleon living for any length of time in confinement, simply because their quarters are not sufficiently heated. The temperature of an ordinary green-house would most decidedly be too cold: a stove-house would be better. A friend of mine made pets of two chameleons soon after her arrival in Ceylon, and she described them as most pugnacious in their conduct to each other, though perfectly harmless and gentle as indoor residents. They used to fight, and when engaged in battle, the ludicrous way in which they slowly opened and shut their jaws invariably made her aunt, an old lady, "yawn." They were both male reptiles, so she gave one of them his liberty, put him up a tree, and procured from a native servant a lady chameleon, who, in a short time, laid some eggs in a little heap of sand at the bottom of the large wire inclosure, which Miss E. had confined them in. The eggs never hatched, the heat of the sun not being sufficiently powerful on that spot; for in a wild state chameleons always deposit their eggs, and leave them to be matured by the warmth of the sun. If your correspondent Miss Fyfe were to write to "Mr. Frank Buckland," she would probably obtain from that gentleman full information as to how they are treated in the Zoological Gardens. I have been told that they give them meal-worms, a food much relished by them, and that they sprinkle the plants in their case with water daily, because chameleons never drink water from any vessel, and therefore it is found requisite to supply them with liquid in a like way to what they obtain it in their native forests.—*Helen E. Watney.*

The Chameleon.—Many of your readers will doubtless be interested in hearing that one of these curious animals has recently been found at Maidstone. My authority, after speaking of a poetical allusion to its "triple claw," says:—"The triple claw is correct enough; it appears to be but triple. When the claw, however, is distended, no fewer than five extremely minute talons, like those of a kitten, are developed, and by these a firm hold of even a considerable-sized branch is obtained. By placing the two wrists together as a man does when he is manacled, then throwing both hands open as widely as possible, you see the shape of each foot; and, by imagining the talons spoken of to be at the ends of the fingers, an idea may be formed of the great holding-on power the Chameleon possesses. The eye is extremely difficult to describe fully. It is sunk in a conical tube or receptacle, evidently to protect it: this tube revolves in any direction with the ball of the eye, so that, although the latter is remote, no obstacle is presented to the vision. The eye is very small, but brilliant in the extreme, somewhat like that of a toad, but not a quarter of the size. A 'hood,' apparently, but which is not movable, covers the neck. The back is arched, and very thin all along the top. The inside of the mouth is a bright red. When inhaling the atmosphere, and viewed through a glass, the whole body of the animal appears rugged like the bark of a tree, and *shell*-like to the touch. The length of the body is about six or seven inches." The animal was very slow in its movements. Its colour was invariably black or dark at night; it appeared white on one occasion, but green or yellow seemed to be its favourite colour. It slept suspended by its tail, and was capable of elongating its body at pleasure. It lived about a month after its capture, and died during the cold weather. My authority considers that it was imported from Spain among some Esparto grass, an article frequently deposited on a wharf adjoining a garden in which the chameleon was found.—*J. S., Jun.*

What does Gryllus viridissimus eat?—For the information of "E. A. M.," I might state that it is strongly suspected, though not absolutely proved, that this species is occasionally carnivorous; and should this be so, its food would probably be aphides, and other small fry of that character. From the apple supplied to the specimen watched by "E. A. M." small insects or other living creatures may have been got. Buds of different trees and plants are doubtless resorted to for food by this "most green" and very lively gentleman, whom it is much easier to hear than to see or catch. The eggs are deposited in the ground during the summer or autumn, but the females are said to select for the purpose a sandy or friable soil, and the captive insect was probably dissatisfied with the earth which was within its reach; or its reluctance to oviposit may have arisen from the circumstance that it was not impregnated.—*J. R. S. C.*

Ichthyosaurus.—In your February number you refer to a notice in the *Standard* as to an ichthyosaurus said to have been recently found at Charmouth, with fœtal young *in situ*. Do you know if this specimen has been examined by any competent authority—if so, by whom? Further, would you kindly say where specimens with fœtus *in situ*, upon which you found your closing remarks, may be seen? Your reply to these queries will, I am sure, be of interest to many of your readers.—*G. Potter.*

[We do not know if the identical specimen referred to has been examined. But specimens are not rare showing the position of the fœtal young. For proofs as to the viviparous nature of the *Ichthyosauri*, see Owen's "Palæontology," Page's "Handbook," &c.—Ed. S.-G.]

Phyllactidium pulchellum (*ante*, p. 47; Science-Gossip, 1867, p. 178).—I found many specimens of this plant in 1870 on leaves of *Anacharis* taken out of a small stream near Winchester.—*F. J. Warner.*

Stag Beetle.—If G. Guyon had used his finger instead of a stick, he might perhaps have felt the effects of a pinch from the long mandibles of the Stag Beetle. If, when they are flying, they should be stopped, or if they are irritated in any other way, they will generally grasp anything which is placed near them. I know a man who allowed one to take hold of his finger, which caused it to bleed considerably.—*A. E.*

Poisoning Dried Plants.—Your correspondent J. T. Mott asks whether it is necessary to wash plants with corrosive sublimate to preserve them from insects. I am of opinion that it is necessary, as I have seen specimens not done so, completely eaten into holes. I have a considerable number of specimens myself, and have washed them all, and find no inconvenience from the ravages of insects. I also think with Mr. Mott that a close box is a great help to preserve them.—*T. B. Blow, Welwyn, Herts.*

Aluada arborea.—In reply to Mr. Warner, I beg to say he is quite right in correcting the scientific name given by me to the Tree Pipit. The mistake occurred partly through carelessness and partly from my dislike to the term *Anthus* being used to designate any of the Lark tribe; for, why have a word so indefinite as to be applicable to any small bird, when we have such a capital generic appellative as *Alauda?* In answer to Mr. Kingsley, I would state that my present observation enables me to distinguish four kinds of larks in this neighbourhood—Skylark, Wood-lark, Titlark, and Tree Pipit. The first three reside with us all the year round, the last is a bird of passage; and, as I said in my note, "the song and flight are so peculiar, that it will be impossible to mistake it for any other." Doubtless there are other varieties of larks in our beautiful fields and woods; but, as I never shoot for purposes of verification, and have acquired my experience of the songs of birds from living specimens kept in confinement, or the instruction of friends during happy rambles over hill and dale, I do feel certain of knowledge gained in such a practical manner; and I do not hesitate to assure Mr. Kingsley he will no longer find any difficulty in distinguishing the Tree Pipit from the Wood-lark, if, next May and June, he lie about on fine sunny days in the hayfields, and watch the sky-rocket ascent and fluttering descent of this delightful bird. I thank Mr. Kingsley for his kind courtesy in giving me credit for an observation which I am sorry to say I have never made, that the *Alauda arborea* (or Tree-lark, as he calls it) sings at night. I most fervently hope that such is the case in Hampshire, where he lives, for I am not quite sure whether I do not prefer Wood-lark to Skylark music; and, in wishing him the enjoyment of its mellow strains by night as well as by day, I can fancy no sweeter lullaby.—*Joseph Drew.*

The Lesser Pettychap.—Mr. Westropp sends us the notice of the very early appearance (the 9th March) of the Lesser Pettychap (*Sylvia hippolais*), which may interest some of our ornithological readers.

Starlings.—Do starlings usually remain with us during the whole winter? as those which have lived on my house for the last three or four years have never left us at all this winter, but have been seen and heard on the Vicarage roof and chimneys every fine, or even fair day. What does their winter food consist of?—*H. O. S., Gateshead.*

Wood-Pigeons.—What is the general food of wood-pigeons, especially in the winter? They are accused of eating corn, &c.; but we had some this week (purchased on Feb. 16, from Scotland); the crops of three were quite full of turnip-tops, one of turnip-tops and clover, and one of clover only; and the birds in very good condition. Is such food usual?—*H. O. S., Gateshead.*

The "Liver" (p. 69).—It is unfortunate for Mr. Joynson's theory that the bulk of his examples are Saxon: *ex. gr.*, Ormskirk, Runcorn, Wallasea. Since it is to the Saxon we must look for the true derivation of "Lither," Litherland I understand to mean the district since re-christened as "Waterloo." It is in Sefton or Sephton parish (*ton*, A.-S.), near Scaforth (true A.-S.), Crosby (*by* is Scandinavian), Aintree, Netherton, and Thornton, both pure Saxon. Premising that the word "pool" was common to both Saxon and Welsh, I may just remark on the inconsistency of joining Gælic and Welsh to produce a compound: it may not be impossible, but it is unusual. I do not find "pool" in Gælic, while the Welsh "Ll" would produce a different sound from the "L" in Litherpool. In Anglo-Saxon we have several forms of the root Liđe; but our best illustrations may be drawn from the lowland Scottish. Jamieson quotes: Lithe, *adj.*, "calm, sheltered." Lythe, *verb* and *noun*, and Lither, *adj.*, as "lazy, sleepy;" Lithis is comfortable. Much stress has been laid on the word *lither* as "landing-place;" but it is far preferable to take it as indicating the sheltered pool at the Mersey side. Mersey is pure Saxon.—*A. Hall.*

White Varieties (p. 45).—White varieties of many plants may be only occasionally seen, appearing under certain conditions, and lasting only so long as these conditions prevail, while in other cases these varieties *seem* to be permanent; but I believe that all varieties, whether natural or brought about by artificial means, tend to return to their normal state. Last autumn but one, while staying at Ardlethen, Aberdeenshire, I noticed some plants of the Harebell Campanula (*C. rotundifolia*) with some flowers perfectly white, while others, on the same plants, had a tinge of blue; but last autumn, on the same spot, not a white flower was to be seen—all were blue. The plants were growing at the edge of a narrow band of Silurian limestone, the adjoining rocks being gneiss and granite.—*John Hopkinson.*

Geological Guide to Sicily (p. 70).—Should "a Subscriber" not meet with a suitable guide-book to Etna, he may perhaps find the required information in the following works:—Ferrara, "Descrizione dell' Etna;" Palermo, 1818; Hoffmann, "Geognost. Beobachtungen," Berlin, 1839; Lyell, "Principles of Geology;" Scrope, "On Volcanoes." The following papers in the Quarterly Journal of the Geological Society may also be consulted:—Abich, "On some points in the History and Formation of Etna," vol. xv. p. 117; Gemellaro, "On the Gradual Elevation of the Coast of Sicily," vol. xiv. p. 504, and "On the Volcanic Cones of Palermo and Motta, Etna," vol. xviii. p. 20.—*John Hopkinson.*

Gold-fish.—Having a large number of gold-fish, I gave some of them to a friend. Soon after he had received them, he told me he had seen some little ones in the globe with the others, but that the large ones ate them as soon as they appeared. A few days after he saw the above, he saw some spawn in the globe, and some more of the small ones appeared: these he has taken out. I shall feel obliged if you, or any of your readers, can tell me if this is a common occurrence, and if there is any way of rearing these small fish.—*Tom V. Devey, Wolsingham.*

Abnormal Cerastium (pp. 259, 279, 1871).—I was, in all probability, wrong in referring this curious specimen to *Arenaria*, though I did not speak very positively about it. I and others have again examined specimens, and the evidence seems to be in favour of its being a *Cerastium*.—*Robert Holland.*

The English House-fly in New Zealand.—One large blue-bottle fly is a terrible torment in New Zealand. Not only does he "fly-blow" the meat, but he lays his eggs in the blankets also, with the usual unpleasant results, if they are not at once got rid of. But the house-fly was, until lately, unknown. The following history was told to me by a friend lately returned from Christchurch, New Zealand, where he had worked for the last six years. A few years ago it occurred to a resident in New Zealand that if the common house-fly could be introduced from England it would assist in exterminating the blue-bottle. Accordingly, when the time came for him to take a holiday to the old country, he did not forget to collect flies just before his return. He kept them in a box during the voyage, and fed them with bread and bits of sugar, and not many lives were lost. The party arrived at an accommodation-house on the Rakaia river, and here the caution of our naturalist appears to have deserted him. He opened his box either to feed or display his flies, and through some inadvertence the whole of them escaped. But the experiment was not without some results. My friend and informant came to England a few months ago, and he says that the common house-fly is thoroughly domesticated in New Zealand, but with what result with regard to the blue-bottles he is unable to state, more than that where the flies are numerous the blue-bottles are certainly scarce. Does this account of the introduction of house-flies appear true? I relate it as it was told to me, but it seems to me unlikely that the flies would have lived through the voyage. Have any of your correspondents heard the flies accounted for before, or this story in any other form?—*M. A. D.*

The Ermine in North Wales.—What does "W. P." in last month's Science-Gossip mean by saying that the Ermine is rare in North Wales, but the "Stoat, Weasel, &c., are common enough"? Of course he is not ignorant of the fact that the Ermine (*Mustela Erminea*) is simply the Stoat in its winter coat. I have lately seen a specimen of the *Erminea* which was killed before it had completed its transformation; the lower half of its body is white and the upper brown. I should like to know the meaning of "W. P.'s" communication, as it would be a curious fact if most of the stoats die before assuming their winter dress.—*W. W.*

Variety of the Tufted Duck.—I should be glad if "P. P." would kindly favour us with a more minute description of the plumage of the duck he mentions in the February number, also the colour of the iris, the legs and feet, when fresh, and the extent of the buff colour upon the lower part of the breast. Does it blend with the dark colour of the lower neck, or is the band across the chest well defined, and of the usual colour? I should also like to know if any of the buff colour extends to the sides and vent-feathers. —*T. Southwell.*

Why do Caterpillars weave Webs?—The author of a paper in last month's issue of Science-Gossip, on the "Web-weaving Caterpillars," invites observers to offer their opinions on the reasons why some lepidopterous larvæ are endued with this habit. It is not easy to give a satisfactory answer which will meet all cases. One thing would strike us as notable at the outset; namely, that a very large number—the majority in fact—of those which spin webs or form nests are hairy caterpillars, and therefore, as a consequence, the less in need of any protection of their own making to screen them from birds; for I presume, in the caterpillar-hunting species, it will be found, as a rule, that they prefer smooth-skinned to hairy individuals when they can get them. And again, it must be remembered that many solitary larvæ which do not form a web for their protection are in the habit of employing their silken store occasionally in spinning a *web*, or else some slight shelter for themselves in windy weather, or during the periods when they are casting their skins. Among the uses which caterpillars' webs subserve, these may be indicated:—1. They afford the caterpillars a screen from rain, high wind, and moderate also the influences produced by changes of temperature. 2. They protect them during their changes of skin. 3. They may insure the caterpillars a firm foothold while feeding, often a circumstance of importance. Some species are most careful to extend their webs or nests so as to cover the different boughs or twigs upon which they feed. 4. They ward off the attacks of birds, at least sometimes, and may also prove a safeguard against parasitic insect enemies. As to the Lackey (*B. Neustria*), which Mr. Lovekin has referred to amongst others, it is observable that when the caterpillar becomes of good size its social habits cease, and each wanders separately. I was certainly not aware, however, that this caterpillar is more fortunate than its brethren in being nearly exempt from the peril of being devoured by birds. The Gold-tail (*L. auriflua*), though conspicuous enough in the early summer, does not then conceal itself by a web, which, in this species, is only formed as a winter retreat.—*J. R. S. C.*

Large Green Grasshopper.—I found that this insect would readily eat raw beef some years ago, and I then noticed the fact in Science-Gossip. I have since tried some experiments with another specimen, and found it was very partial to apple-leaves and small grasshoppers; but the uncooked meat offered him was refused; so I came to the conclusion that grasshoppers, like human beings, differ in their taste respecting diet.—*Helen E. Watney.*

Singing Mice.—I cannot give the same experience of singing mice as your correspondent last month. The singing mice in my present residence, on the banks of the Rhine, sing while running in the room, and only seem to intermit while feeding, and but for a moment. The sound varies from a soft cheep-chirp to that of a spring running down when over-wound, but more regular, and gives the idea of activity and glee. These mice, both singing and mute, are much larger than English house mice, and often dig large holes in the earth round my plants in pots. They also eat the leaves of some plants, so as to strip them, and only yesterday bit off the tops of a bouquet of violets (Neapolitan), primulas, &c. On several occasions they have attacked my canaries, which I suppose to be unusual. Can your other correspondents inform me if they have experienced the like? All the mice frequenting my house are singularly bold, and comparatively indifferent to noise, continuing their employments while the iron of my stove rattles from their efforts. Cheese is held of no avail here in trapping mice; they can only be tempted by meat.—*Tedesca, Prussia.*

Sponge Spicules.—All I can say in reply to "H. R.," is that one fragment of freshwater sponge—and one alone—furnished the spicules figured in Science-Gossip, which, on account of the birotulate spicules of the ovary, was referred to *S. fluviatilis*. If it combines the characters of the two species, systematists must settle the question.—*C.*

Scotland and the Unicorn (p. 46).—The unicorn supporting the British arms on the sinister side is *derived* from Scotland, but whether connected with that figured on Queen Margaret's seal, I cannot say. James I., as King of Scotland, had for his supporters *two* unicorns; and on succeeding to the English throne he introduced one of them as a supporter of the arms of the United Kingdoms.—*G. H. H.*

Spring Fungi.—Admirers of the beautiful during their walks this spring should look in damp sheltered situations, where fragments of rotten sticks are overgrown with moss, for the gorgeous cups of the Carmine Peziza (*P. coccinea*). A specimen of this plant when once found never fails to elicit admiration from those to whom it is shown. The December number of Science-Gossip contained an account of the Orange Peziza (*P. aurantia*). This species is autumnal, grows on the naked ground, and has its sporidia rough with little granules. The Carmine Peziza is to be found in winter and spring, growing on fragments of wood, which may, or may not, be buried in the soil. Its sporidia are oblong and quite smooth. The interior of the cup is of a rich carmine hue, the exterior whitish. The Rev. M. J. Berkeley mentions a variety that occurred at Kilmory which was quite sessile, and orange externally. Has it been the good fortune of any of your readers to meet with this variety ?—*C. B. P., King's Lynn.*

Oölitic Fossils.—Wishing to compile a list of fossils of the Cornbrash, Forest Marble, and Fuller's Earth, I shall feel greatly obliged to any geologist who will send me a list of the species that he has observed in those formations. I should also be glad to know of any good and easily accessible sections of those rocks in the West of England.—*H. J. Parsons, M.D., Beckington, Somerset.*

The Passion-flower.—In the restoration of our churches now in progress we are frequently told that in windows and screens the Passion-flower is used, evidently under the impression that such a flower had been previously used there. Can any of your readers give an authority for the early appropriation of this elegant flower to the purposes of ecclesiastical symbolism ?—*E. C.*

Dagger-moth.—I dare say my question is a stupid one, but it is one I should nevertheless like to see answered. What proof have we that the insects, *Acronycta psi* and *tridens*, are not the same species with a permanent variety in the larva ? The extreme similarity between the perfect insects of the two (so-called species) renders it impossible to distinguish between them in the perfect state.—*C. Lovekin, Notting Hill.*

Canine Gyrations.—Your correspondent Mr. Lefroy finds a speculative analogy between the gyrating habit of dogs and the spiral growth of certain plants. It may interest him to know that a "similar connection between the vegetable and animal world in this matter" was humorously suggested by the late Mr. Wilson, the bryologist, who, in a letter to me a few years since, after describing the male inflorescence of Sphagnum, concludes thus:—"Dogs are said to gyrate because they cannot at once find the head of the bed; these spermatazoids perhaps from indecision of character, or uncertainty as to the route, being only partially endowed with instinct." Perhaps this explanation of the canine habit may be found as satisfactory as that suggested by Mr. Darwin.—*C. F. White, Windsor Road, Ealing.*

Name of the Lackey Moth (p. 85).—A contributor to Science-Gossip has quoted a statement regarding the English designation of the above species, which I cannot but believe incorrect. The Rev. J. G. Wood adduces no proof that the name "Lacquer" Moth was once applied to it, and, in course of time, corrupted into "Lackey." The assertion of other authors is much more plausible; namely, that the caterpillar gave rise to the name which the moth bears in one of two ways. Some say it is like a "lackey" because of its variegated clothing, resembling in its costume certain serving-men or lackeys who used to attend upon noblemen a century ago or thereabouts. Footmen's fashions have, however, now been considerably modified. Others, again, will have it that the slow and steady way in which these caterpillars follow each other on their excursions for food while young was compared by some observer of the olden time to the stately procession of retainers preceding some person of dignity. I venture to think either of these suppositions more plausible than the one quoted.—*J. R. S. C.*

Stag Beetle.—In answer to G. Guyon, p. 45, I can also state that I have never experienced any severe bite from a male stag beetle (*L. Cervus*). I captured several last year, and handled them without hurt; but I should advise "A. E." not to try the female *cervus*, or he will get a hard grip for his pains, as I know, to my cost, their sharp jaws will nearly pierce the skin. I have often surmised what is the cause of the male insect having such large antlers, as it is evidently not for feeding purposes, or the female would be likewise provided; the fact of their possessing but little power also denies the imputation of fighting or burrowing with them.—*John Henderson.*

Sandpipers.—Is it usual for sandpipers to stand on the shore and allow the waves to wash over them, as some here were observed to do so ?—*H. G. R., Weston-super-Mare.*

The Bull-frog.—This reptile, which is the largest of the frog tribe, is very common in the swampy parts of Canada. It is from six to seven inches in length, and the hind legs are eaten, and esteemed a great delicacy, somewhat resembling, but superior to, chicken.—*E. C. Lefroy.*

A White "Brimstone."—A friend of mine has in his collection a variety of the Brimstone butterfly (*Gonepteryx rhamni*), male, having in the centre of the anterior wings a large patch of deep orange. From its differing from the Brimstone in no other respect, I presume it to be a hybrid between that and the Clouded Yellow (*Colias edusa*).—*H. Moore, 67, Preston Street, Brighton.*

Erratum.—I find a slight typographical error in my note on the Gipsy-moth on page 69. In the ninth line from top for *mules*, read *males*.—*R. Laddiman.*

NOTICES TO CORRESPONDENTS.

W. D.—The ordinary way of becoming a Fellow of the Linnean Society is to get proposed by two Fellows, who can testify to personal knowledge of the candidate, and of his fitness for election. If you know a F.L.S., communicate to him your desire, and no difficulty will follow.

J. L.—We have inquired, but are sorry we cannot give the information our correspondent desires respecting dried seaweeds. A little powdered quicklime will get rid of the black slugs, and do the ferns no harm if it be used in moderation. Common salt also may be used, and, perhaps, with greater safety.

P. A. S.—Pseudomorphic crystals of rock-salt from the Trias: they are common in the upper beds, and have been formed by the slow replacement of fine mud in the moulds left by the salt cubes.

A. S.—The specimen of lizard sent is the "Smooth Water-Newt" (*Lophinus punctatus*), or "Water Evat." The tradition is pretty general as regards its reputed stinging powers, and as unfounded as it is firmly believed in. For a full account of this reptile, and a refutation of the theory of "stinging," see Cooke's "British Reptiles." Hardwicke, London.

J. P. G.—The specimen sent is evidently a lichen, but it is not sufficiently good for identification.

R. V. T.—The lichens on the rock fragments have given us no little trouble. We have submitted them to several fungologists, but all are of opinion that they are in too immature a condition to have the species distinguished.

Francis Buckell.—We cannot inform you where a slide of the lactiferous vessels of plants can be obtained. Why not mount them yourself? They are easily procured by macerating the leaves, &c., of plants containing them, and when obtained, mounting them in a solution of gelatine and carbolic acid.—*F. K.*

R. H. N. B.—Your sketch is much too indefinite to enable us to say whether the crystal is anything unusual. The characters of crystals vary according to temperature and strength of solution employed.—*F. K.*

W. L. N.—Both the "Oak-spangles" and "Silk-buttons" are very common on the backs of leaves, especially on those of the Oak. They are formed by an insect—a species of *Cynips*. For full account, see Science-Gossip, vol. ii. p. 228.

R. Brown.—The plants are—A. Variety of *Chenopodium Bonus Henricus*. B. *Chenopodium botryoides*. C. *Chenopodium album*.

W. H. W.—The fly sent is the common Sand-wasp (*Ammophila subulosa*). It deposits caterpillars of different species of *Geometridæ* in its sand-burrows, for the nutriment of its young.—*C. G. B.*

E. C.—The insect commonly known as the "New Forest Fly," which is so troublesome to horses, is *Hippobosca equina*, Linn.—*C. G. B.*

M. H.—The plant is *Galinsoga parviflora*, a native of Peru, which has been completely naturalized in the neighbourhood of Kew for some time.—*B.*

W. Sargent.—The directions given in Hogg on the Microscope are those usually employed. The following plan may, perhaps, be found useful when it is desirable to mount quickly:—Place the specimen in liquor potassæ, boil for a few minutes, wash in warm distilled water, boil again in carbolic for a short time; the preparation may then be soaked in benzole, and afterwards mounted in balsam in the usual manner. Entomological specimens are, however, best mounted in some preservative fluid (a dilute glycerine and carbolic acid will be found well suited for that purpose).

E. C. Jelly.—You do not say whether your zoophytes are killed with the polypi expanded, or are only the polypdoms. If the former, weak spirit would not be sufficient to prevent decomposition. Goadby's fluid, or dilute glycerine and carbolic acid, would be best. If they are the polypdoms only, wash away all traces of salt, and dry between blotting-paper. When required for mounting, soak them for some hours in the mounting fluid, and they will regain their original form.

EXCHANGES.

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

Larvæ of *C. villica*, and eggs of *B. Neustria*, for eggs, larvæ, or pupæ of other Lepidoptera.—H. A. Auld, 62, Granville Park, Blackheath.

A liberal exchange in selected Diatoms, Spicules, &c., for real Upper Peruvian guano; presence of *A. formosus* to be test of genuineness.—J. K. Jackson, Talbot Street, Oldbury, Birmingham.

Erratum.—In A. N.'s exchange offer in March number of Science-Gossip, for "Yarrow," read "Yarra."

Hippothoa divaricata, unmounted, for *Hippothoa catenularia*.—Miss Jelly, 2, Princes Road, St. Leonards-on-Sea.

For Tous les Mois or Carina Starch and Scales of Gold-fish send stamped envelope and object to Miss E. De B. Meyrick, Downshire Lodge, Blessington, co. Wicklow, Ireland.

Colias, *Edusa*, *Vanessa polychloros*, *Limenitis*, *Sibylla*, *Hespina Comma*, for other Lepidoptera.—Joseph Anderson, Jun., Alresford, Hants.

Hawfinch, Cuckoo, Kingfisher, Sparrow-hawk, and Tawny Owl's eggs in exchange for others.—Frederick Anderson, Alresford, Hants.

Foraminifera from High and Low tide, Connemara, West coast of Ireland, ditto from the Mediterranean. Send stamped envelope and any object to Joseph Clegg, Jun., Croft Bank, Shaw, near Oldham.

Pecten opercularis, *Cardium Norvegicum*, &c., for other British marine shells.—A. W. Langdon, Llanrwst House, Hastings.

Fresh Microscopic Fungi (including Cluster-cups), during the coming season for unmounted objects. Lists to H. English, Woodstone, Peterborough.

For Hairs of Angora and Pekan send stamped envelope and objects of microscopical interest to J. Sargent, Jun., Fritchley, near Derby.

Sections of Brazilian twigs, *four varieties*; send address and stamp with any microscopic material to Joseph Asten, Baron Street, Rochdale.

Leptotrichum *subulatum*, *Desmatodon nervosus*, *Trichostomum littorale*, &c., offered in exchange for others. Send lists to R. V. T., Withiel, Bodmin.

For spiral fibre tissue from seed of *Tragopogon pratensis*, send stamped directed envelope to T. H. Martin, 86, Week Street, Maidstone.

Olnhamia in exchange for Trilobites.—James Gourley, Killinchy, co. Down.

Wanted to take in exchange or buy, a good specimen of the Kingfisher. Stamped envelope and particulars to W. H. Hunt, Hendford, Yeovil.

British Lichens wanted; Belgian Mosses and Lichens offered in exchange. Address E. Marchal, au Jardin Botanique, Brussels.

A number of Lepidoptera in exchange for various species, of birds' eggs.—R. Kay, 2, Spring Street, Bury.

Polariscopic and other objects; rare Chemical Crystals, Polyzoa, &c., mounted or unmounted, for other good objects. Address, Rev. J. M. Mello, The Rectory, Brampton, St. Thomas, Chesterfield.

British Birds' Eggs for others, and British or foreign Lepidoptera.—S. L. Mosley, Almondbury Bank, Huddersfield.

Barbadoes Polycystina, symmetrically arranged in balsam, opaque; in exchange for good slides of named diatoms. —G. H. Stubington, 3, Agnes Villa, Basingstoke.

Crystals of Oxalmate of Ammonia for other good mounted objects; anatomical preferred.—R. Smith, Jun., Stone House, Belper.

Young state of *Balanus balanoides*; Scalariform tissue from fern; Spicules of *Halichondria panicea*; Palates of Mollusca for other mounted objects.—John C. Hutcheson, 8, Lansdowne Crescent, Glasgow.

BOOKS RECEIVED.

"The Higher Ministry of Nature." By J. R. Leifchild, M.A. London: Hodder & Stoughton.

"Science and Humanity." By Noah Porter, D.D., LL.D., &c. London: Hodder & Stoughton.

"The Lens." A Quarterly Journal of Microscopy. Chicago.

"The Journal of Botany." March.

"Annals and Magazine of Natural History." March.

"The Zoologist." March.

"The American Naturalist." February.

"The Entomologist's Monthly Magazine." March.

"Practical Physiology, a School Manual of Health." By Dr. Lankester, F.R.S., &c. Fifth edition, enlarged. London: Robert Hardwicke.

Communications Received.—G. H. K.—T. S.—F. K.—M. K.—C. G. B.—T. G. B.—B. W. F.—C. F. W.—J. S. M.—J. H. M.—E. C. L.—W. H. H.—W. M. M.—C. K.—H. R. R.—W. W.—A. H.—H. E. W.—J. R. S. C.—W. W.—M. S.—J. H.—R. L.—C. C.—T. C. B.—J. H.—J. A.—J. S.—G. N. M.—T. H.—A. W. L.—R. H.—H. M.—G. T.—H. W.—E. G.—G. F. W.—S. L. M.—J. M. M.—M. A. D.—R. K.—R. H. N. B.—H. O. S.—J. G.—J. P. G.—A. S.—W. L. N.—H. E. W.—E. L.—C. S. P. P.—W. (Oxford).—W. H. W.—W. B. P.—J. P. G.—J. L.—E. C. J.—R. H. W.—E. D. B. M.—E. C.—J. A.—F. A.—J. D.—W. S.—J. C.—H. E.—A. W. L.—E. C. L.—W. A. G.—W. D.—M. H.—E. W.—A. N.—W. D.—H. A. A.—T. P. L.—C. G. R.—F. C.—J. R. J.—C. F.—H. H. H.—W. D.—H. G.—R. S.—H. M.—H. A.—G. H. S.—J. C. H.—S. M. J.—R. P.—R. P. U.

COLLECTING AND PRESERVING.

No. IV.—FLOWERING PLANTS AND FERNS.

By James Britten, F.L.S.

THE kindred subjects of the collecting of plants and their arrangement in the herbarium have been treated of over and over again, and it might almost seem as though nothing further needed to be said upon the matter. But in spite of all that has been written, it cannot be said that anything like uniform excellence has been attained, either in the collecting or drying of specimens: on the contrary, much carelessness is still exhibited in both particulars, and the following remarks on the subject may therefore be useful to some, at any rate, among the readers of Science-Gossip. It has been found impossible to treat both points adequately in one paper, so, on the present occasion, we shall devote ourselves to collecting, leaving the arrangement and matters connected therewith for another occasion.

The great aim to be kept in view in collecting is to obtain as perfect and comprehensive a specimen as possible; that is, one showing every part of the plant,—root, leaves, flowers, and fruit. It is not always practicable to show all these upon one specimen, and in such cases such a number must be selected as will carry out this plan. The wretched scraps with which some collectors content themselves are not only useless to their owners, but annoyances to every one who has to do with them, or who is requested to pronounce an opinion upon them. Even among the readers of Science-Gossip there are those who do not scruple to send for determination single leaves, or a terminal shoot of a flowering plant, or a pinnule of a fern without fruit; a proceeding which is unfair to those to

Fig. 62. Young Plant of *Ipomœa Quamoclit* (from Decandolle's "Organographie.")

whom they are submitted, inasmuch as they either have to risk their reputation for accuracy, or to appear uncourteous by refusing to have anything to do with such specimens.

To begin at the beginning, how rarely do we find the embryo of any species represented in a collection of dried plants. It ought to be there, not only as essential to the complete presentment of the history of the species, but as in certain cases indicating relationships which are not apparent when the plant is more advanced. Those who have not observed them would be surprised to find how much variety of form exists in the cotyledons alone, from the fleshy cotyledons of many of the Leguminosæ, the Horse-chestnut, &c., to the foliaceous ones, or seed-leaves, of other plants. Among the latter may be noted and compared the

Fig. 63. Lime (*Tilia europæa*).

lobed or palmate cotyledons of the Lime (fig. 63), the glossy dark-green somewhat kidney-shaped ones of the Beech (fig. 64), and the pinnatifid ones of the common garden Cress (*Lepidium sativum*), the obcordate ones of the Mustard or Radish, the long narrow thin ones of the Sycamore (fig. 65), the sinuous or corrugated and bilobed ones of the Walnut,—and many more which will occur to the observant reader, or which may be collected by any one who will take the trouble to watch the germination of plants. And by making such collections, unexpected discoveries may arise, which will yet further confirm what has been said about the variety in form and structure even in these beginnings of growth. Plants which are, on account of their general affinities, reckoned among the dicotyledons, may be found on investigation to have but one cotyledon, as Dr. Dickson observed to be the case with two of our Butterworts, *Pinguicula vulgaris* and *P. grandiflora*, the third species, *P. lusitanica*, being dicotyledonous; or even to be acotyledonous, as is the case with the Dodder (*Cuscuta*). In the latter-named genus, it is of importance to collect young specimens, as showing that the plant, although parasitic as soon as it comes in contact with a suitable foster-plant, is of independent origin. A search among young plants will no doubt lead to the discovery of some abnor-

Fig. 64. Beech (*Fagus sylvaticus*).

malities, such as the tricotyledonous embryos lately discussed in Science-Gossip. Of some plants, such as the Furze, the true leaves can only be found at an early stage of growth; in others, much variation may be noted in many points between the first leaves and the more perfect ones which succeed them; some, as the Holly, at once developing leaves similar to those which are produced throughout the life of the plant, and others going through many modifications before the ultimate shape is attained, as in the Ash, Elder, Ivy, Maple, &c.

The roots or rhizomes also require to be much more fully represented and carefully collected than is usually the case. In every instance where the size of the plant does not prevent, the subterranean and subaqueous parts should be carefully procured and preserved. Dr. Trimen has lately directed attention to the corm-like tubers of the Water Plantain (*Alisma*),* closely resembling those of the Arrowhead (*Sagittaria*), which have been described and figured by Nolte, but "do not seem to have been observed, or at least properly understood, in this country. They are buds remaining dormant through the winter, and containing a store of nutriment, to be employed in the development of the new plant from the tuber in the next year."

Fig. 65. Sycamore (*Acer pseudo-platanus*). Showing Cotyledon, and first and second pair of leaves. All drawn by Miss Giles, from specimens lent by Mr. O. A. Favvis.

Similar bulbs are developed by the Frogbit (*Hydrocharis*). In determining many grasses and rushes, it is of importance to ascertain whether the rhizome is creeping or cæspitose, and it is therefore essential to collect good specimens. In the case of such plants as the Coral-wort (*Dentaria bulbifera*) and Tooth-wort (*Lathræa squamaria*), the root-stocks are eminently characteristic. Of such parasites as the Broomrapes (*Orobanche*), some care is requisite in obtaining specimens in which the connection between the parasite and its foster-plant may be preserved and shown. The absence or presence of tubers should also be noted, and if present, they must be represented.

Passing on to the leaves, we may note the importance of obtaining in every case the root-leaves of each species. These are often very different in form from the stem-leaves, as in such species as the Harebell (*Campanula rotundifolia*), *Pimpinella*, *Saxifraga*, the Earth-nut (*Bunium flexuosum*), and many more; in some instances, as in the Jersey Bugloss (*Echium plantagineum*), they at once characterize the species. Still more important are these lower leaves in the case of water-plants: in the Arrowhead (*Sagittaria*), for example, they are narrow, and resemble those of the Bur-reed (*Sparganium*); and in the Water Plantain (*Alisma Plantago*), the submerged leaves are equally different from those which rise out of the water. This difference is still more noticeable in the case of the aquatic *Ranunculi*, where a knowledge of the submerged leaves is essential to the discrimination of the various forms or species.

Where practicable, the whole plant should be collected for the herbarium; but when, from its size, this cannot be accomplished, leaves from the root, the centre of the main stem, and the lateral branches, should be taken. As to the stem itself, that must be represented: in the *Rubi*, indeed, it is essential. "To judge properly of a bramble from a preserved specimen," says Professor Babington, "we require a piece of the middle of the stem with more than one leaf; the base and tip of the stem are also desirable, likewise a piece of the old stem with the flowering shoot attached to it; the panicle with flowers, and the fruit. We likewise want to know the direction of the stem throughout, of the leaflets, and of the calyx; also the shape of the petals and the colour of the styles: a note of these should be made when the specimen is gathered."

Passing on to the flowers, we shall find it necessary to represent them in almost every stage, from the bud to the perfecting of the fruit. It is of course in most cases possible to select an example in such a state as to show upon the same plant buds, flowers, and fruits; but where this is not the case, each of these particulars must be supplemented by additional specimens. The turn which botanical investigation has recently taken towards the study of the phenomena connected with fertilization has given the collector another subject to which his attention may be profitably directed. It has been observed that in some plants the stamens are developed before the pistils, in others the pistils are matured before the stamens; while in yet a third set, stamens and pistils are simultaneously perfected. These three groups of plants are termed respectively protandrous, protogynous, and synaemic, and a very little observation will show that example of each are sufficiently common.

Then in diœcious and monœcious plants, both male and female flowers must be collected; and in some cases, as in the Willows, four specimens are necessary to the complete presentment of the species, showing respectively the male and female catkins, the leaves, and the fruit. Some plants produce two distinct forms of blossom, as is

* *Journal of Botany*, vol. ix. p. 306.

noticeable in the Violets and the Woodsorrel, one being conspicuous and usually barren, the other insignificant and often apetalous, but producing perfect fruit. The pollen will afford occupation to the microscopist: the researches of Mr. Gulliver and Mr. Charles Bailey have demonstrated that important distinguishing characters are in some instances furnished by it. While on this point it may be suggested that it is convenient in many cases to collect several specimens of the flowers alone, which, when dried, should be placed in a small envelope or capsule, and attached to the sheet on which the plant is represented. In the event of any examination which may be requisite after the plant is dried, these detached blossoms will be found very useful, and will prevent the necessity of damaging the specimen. In the case of such plants as shed their corollas very readily, as the Speedwells, it is as well to put them in press as soon as collected; and the colour of many may be retained by the same means.

The fruits and seeds of plants are too generally neglected by amateur collectors, but are essential to the completeness of a specimen. It may be found practically convenient to keep these in a separate place, and detached from the plant; and in many cases of dried fruits it is advisable to sort them into their places without previous pressing. By this means the modes of dehiscence will readily be seen: pulpy and succulent fruits should be preserved in spirit. In such plants as the species of Sea Sandwort (*Lepigonum*), and some Chenopodia, important specific characters are drawn from the seed; as they are from the pods of *Melilotus* and the fruits of *Agrimonia*. In collecting ferns, well-fruited fronds must be selected, as it is impossible to determine specimens without fructification. Grasses should be selected when in flower and fruit, but must not be allowed to attain too great an age before they are collected.

We have been speaking so far of the things to be collected, and space will not allow us to dilate at any length upon the apparatus necessary to that end. Nor indeed is this necessary; a good-sized vasculum, with one or two smaller boxes for the pocket, in which the more delicate plants may be preserved; a strong pocket-knife or small trowel, for procuring roots, and a hooked stick wherewith to fish out water-plants, or pull down branches, are the principal things required. To any one residing for any length of time, or even only for a few days, in a district, a "London Catalogue" is an important acquisition, in which should be marked off all the species met with: by this means the flora of the neighbourhood is ascertained at a very slight expenditure of time and trouble. It is not advisable to collect too many plants at once, or to crowd the vasculum, unless under exceptional circumstances; nor should the desire to possess rare plants tend, as is too often the case, to the neglect and exclusion of commoner ones.

A careful and observant collector will frequently meet with forms which deviate more or less from the accepted type of a species. When these appear to offer any marked characters, they should be noted; and in all cases it is well to preserve any forms which, from external circumstances, have a different appearance from the normal state. The differences produced by soil and situation alone are very considerable, and though the essential characters are usually to be discerned, the interest and value of a herbarium is very much increased by a selection of examples showing the range of a species. *Campanula glomerata* offers a good example of this: in damp meadows it is from one to two feet high, with a large spreading terminal head of blossoms, while on chalk downs it is often not more than as many inches, with only one or two flowers: in this state it was described by Withering as a gentian, under the name of *Gentiana collina;* and the same author gives as *Campanula uniflora* a one-flowered mountain state of the Harebell (*C. rotundifolia*).

The collector will also do well to keep a look-out for deviations in structure, which are often of great interest. In short, nothing should be neglected which can tend to the perfect presentment of a species in the herbarium: its utility is commensurate with its completeness. The mere collector may be satisfied with scraps of a rare plant and the absence of commoner species; but the real worker, for whose benefit these hints are offered, will pride himself rather upon the possession of instructive examples, which may be of assistance to himself, as well as to all those who may consult them.

Botanical Department, British Museum.

THE TEST PODURA.

MY first acquaintance with the Test Podura was about four years ago, when I secured a few specimens at Theale, in company with the ordinary Lepidocyrtus. For a period of twelve months after this, my friend Mr. Blatch sent me up various colonies of Lepidocyrti, among which, as I saw by the scales deposited on the cover of the cell, a test-bearing insect occasionally occurred. So much were they alike, however, in their best condition, that I repeatedly failed to distinguish their respective characteristics.

But at last Mr. J. Beck gave me a specimen to report to him upon, that he might compare notes with me; and this time I did grasp two distinctive features of the test-insect which, from subsequent acquaintance with it, seem to be permanent. First, a small tuft of cilia above the head, at the junction of the prothorax and neck. Second, the possession of numerous large scales, rendering it a less gorgeously iridescent creature than the ordinary Lepidocyrtus; there being fewer angles of incidence for the decomposition of the light on its exterior than when the scales are small.

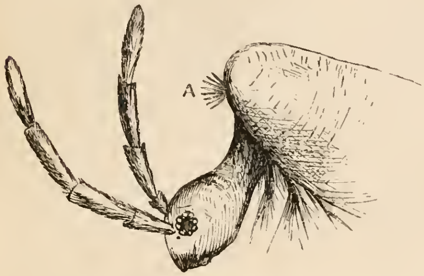

Fig. 66. Head of Test Podura (*Lepidocyrtus curvicollis*). A. Tuft of cilia.

As the structure of all Lepidocyrti scales is pretty much the same, I will lay down, as a suggestion, some data for a really fine test-scale. The scale should be about ·007 of an inch long in the longest, and about ·0025 wide in the widest part; and in the portions where the markings are best developed there should be not more than six or seven of these in the $\frac{1}{1000}$ of an inch linear, measured longitudinally. The markings should moreover be clear and distinct; and if this latter requirement is satisfied, the size of the scale is of less importance. The markings of some very few scales exceed the dimensions I have given, but such scales are of extreme rarity, and it will be found sufficiently difficult to come somewhat near the requisites named above.

During the whole of last summer I kept five test insects in a cork cell together, in the hope of their laying eggs, as by this sign I should know if they were a distinct species by following up the inquiry; but the summer passed, and when the cold weather set in, my five pets died off one by one, without leaving a vestige of eggs. This fact, as well as the general strong resemblance to the ordinary Lepidocyrtus which the test-insect bears, strengthens my suspicion that the test characteristics are merely those of the male insect in certain localities.

I have never been able to distinguish the sexes, nor yet have I ever seen copulation, though there is no difficulty in obtaining eggs, or rearing the young, if the colony originally obtained is numerous. I have never obtained eggs from a solitary podura, however long it may have been in my possession.

The test-insect has to my certain knowledge been obtained at Theale, about the rockwork of a greenhouse, and in the ale-stores, localities abundantly inhabited by the *ordinary* Lepidocyrtus,* but always with great rarity. In my last hunt I only captured one in a take of about forty Lepidocyrti.

The above hints may lead to the discovery of the insects in other localities, and I shall be glad to hear what success attends the search.

S. J. McIntire.

* See Science-Gossip, 1867, p. 55, figs. 39 and 40.

PASSAGES IN THE LIFE OF "PHARAOH."

I SAW him first "that night in June." We had friends to dinner. Some of the guests had arrived. I was sitting quietly all ready-dressed, and doing my duty in the drawing-room. The windows opened on to our suburban lawn. My brother, just arrived from his office in the City, beckoned me mysteriously from the room. "I have a wild animal for you," he said, and led the way to a little place where the coats were kept, and where a small fish-basket stood on the table. Wonder and joyful anticipation took possession of my mind, but my brother endeavoured to induce me to exercise restraint and caution.

"It is a savage creature and will bite. You had better take care how you touch it."

I accordingly peeped cautiously into the fish-basket, and there I saw a mass of yellow furry down. "A young gosling!" was my first thought, but only for one instant, for two large brown eyes and an old sad face with a hooked beak were turned up towards me. There was no mistaking the little owl. We carried him down into the kitchen. I found he only bit at me because he was hungry, and that he was too young to feed himself.

He had the air of a very wise, sad, old man. No feathers showed as yet, nor could his wings be seen when closed. He stood like a little triangle on his two little feet, his head (looking very much too large) being the base of the triangle. His melancholy was deep and settled; it made the tears almost come into one's eyes to look at him; but as he grew older a certain dignity and philosophic placidity of demeanour gradually replaced this look of unutterable sadness. He set to work at once to walk all over the kitchen floor, and stare at every one and everything. He showed no fear, but seemed totally unlike a bird in his ways.

I was quite unaccustomed to owls, and how to feed him properly was a great anxiety to me. I looked into our natural-history books and did the best I could; if he had been older, I might have managed better; but as it was, I very much doubted whether I should rear him. My brother had bought him for half a crown in Leadenhall Market. The young owl had three little brothers with him. I got a large airy basket with a lid for his cradle; I cut up some raw meat and tried to feed him; he seemed to have no notion of eating. I used to have to open his beak, hold his throat, and thrust down the meat as far as possible. The first night I was so anxious about him I kept his cradle in my bedroom, but he leapt up and down and made so much noise I was obliged to let him out, and whenever I woke in the night I could hear his footsteps (he has a singularly heavy tread for a bird) round and round the room. I got up in the dark to feed him, but such a horrible swearing, hissing sort of noise proceeded from under the bed that I tumbled back in a hurry, till daylight should enable me to master the situation better.

I named my bird "Pharaoh"—there was something so truly ancient and mysterious about him. My principal trouble was this: Pharaoh had a dreadful cold in his head; his nose was really always running, and in the morning he could scarcely breathe, and used to be continually making noises between a snuffle and a cough. I bathed his beak and breathing-holes with hot water as often as I could. I did not believe he could survive such an unnatural kind of complaint as it appeared in his case. I gave him hot brandy-and-water out of a spoon twice, and got my brother to go and speak to the man who sold him. The man in the market said that young owls always had colds in their heads when taken early from the nest. The cold continued for a long time, but did not seem to affect his general health.

Pharaoh began to take his food better and to scream incessantly for more; it was quite a work to supply him. I could very seldom get mice. I applied at the corn-chandler's, but never got any. I collected snails off the garden wall, was obliged to crack them, and stuff them down Pharaoh's throat, and this was not a pleasant business at all. Once a frog was killed and cut up. We had some empty stables across the yard, and two large lofts above. Pharaoh slept in one of these; he made his way at once to the corner he liked best, and kept to it. The little unfledged creature would be sitting at the top of a long steep flight of stairs waiting for breakfast, or if I was late, he would come down, and across the yard, and into the hall. I do not think he ever was young or foolish. He walked upstairs whenever it was possible, and would be found sitting boldly on the foot of some one's bed. Going up as many stairs as he could find seemed a special pleasure to him. While Pharaoh was young, I noticed that he preferred dark places, but now, at nearly a year old, he is perfectly accustomed to broad sunlight, and sits contentedly in its full blaze.

Some friends of mine gave me a dreadful account of two young owls caught on Tooting Common, and put into a hamper together. It was supposed that they could not feed themselves, so they were stuffed accordingly; but one day, when the hamper was opened, it was discovered that one of the owls was dead, and that his brother had eaten up the greater part of his body.

There must have been mismanagement somewhere. Pharaoh feared nothing. We had a beautiful cat, whom I never quite trusted with regard to the owl, and a very pretty black-and-tan terrier called Troubadour. When Pharaoh came into the dining-room at breakfast-time, we used to throw bits of bread near him, to see which of the animals, who were both greedy, would dare to touch them. The cat would sometimes, the dog never. The back of a red velvet chair in the drawing-room was Pharaoh's favourite place, though he was not often allowed there. I found him a charming green bower in the foliage of the Westeria which covered the house on one side. I carried him there once or twice out of his yard.

One day I lost him, and hunted all over the stable; the yard gate into the garden was shut, and Pharaoh could not fly. At last I looked in the Westeria, and there sure enough he was; he had been seen going up a ladder, and over the wall, and round the house to get at it. Some people were almost inclined to believe that he had put the ladder there himself to get over, such was the confidence in his sagacity. He was a general favourite, would go out and pay calls, sitting on my wrist, and spend whole afternoons in the pantry, where the parlour-maid used to take him to sit, if she fancied he felt lonely.

By this time my bird was growing beautiful. A wonderful heart-shaped sort of bonnet of grey feathers came round his face: his face was pure white, with the feathers brushed back. Two upright ridges of white feathers stood out like a nose above his beak, and his eyes shone large and deep, and full of discernment. His wings were very beautiful, but unfortunately their development was noticed while I was away for a short time, and an inexperienced hand cut away all the shorter feathers of one wing. This made no difference in his flying, and on my return I was obliged to cut the long feathers also. It has spoiled his appearance dreadfully. The feathers at the back of his neck are fawn-coloured, and so very deep and soft, and of a light grey colour underneath: a new crop came up I noticed only a few weeks ago. His breast is white, and each outer feather has a minute black spot.

The cook told me one day that she really could not have Mr. Pharaoh in her kitchen; he was "as full of fleas as he could be." I was very indignant, and searched all through my beautiful bird without a sign of any insect; at last I discovered she had taken his little spots for nasty fleas.

But with this description of his beauties, Pharaoh is only a barn-owl, I believe; bird-fanciers to whom I have shown him tell me they never saw an owl so tame, and I believe it is very unusual. I have taken him railway journeys shut up in his old cradle and let him out in the carriage to show my fellow-passengers: I have left him for an hour or two in the cloak-room, where he behaved with perfect propriety and surprised the porters.

I once took him away with me on a three weeks' visit to a country house. He was very much admired, came in-doors a good deal, was brought into dessert the first evening. He often sat on the top of the library door, preening his feathers and making a curious singing noise, peculiar to him when very friendly and contented. He makes it to me generally when I talk to him, and scratches my face gently with his beak.

While on this visit I found out what Pharaoh could be frightened at. He was in a shed at the farm, where I left him sitting on a rail; a party of little calves were in the shed, and one of them trotted towards Pharaoh, who, in a sudden fit of terror, jumped into a tub of water, from which I rescued him. He runs up my arm to my shoulder if he is frightened, as I find he is at a horse sometimes, and I just tuck him under my jacket if we meet any. He will nestle quietly for any length of time. I found out that he likes to take a bath; I did not think of supplying him with one till I saw him trying to bathe in his jam-pot of drinking-water. If it rains, he goes out and sits in it till he looks the most wretched little object, his very small though plump body showing its shape through the tight soaked feathers. We moved in the autumn to a house quite in the country; I had a little fowl-house with a small wire enclosure put up in the farmyard, in order to keep four bantam fowls; I put Mr. Pharaoh in as well, as an experiment. It has turned out perfectly; they all five roost on the same perch, Pharaoh always in his own particular place; and I have seen him turn out a hen which got into it once.

I do not think he cares for the fowls, or they for him, and they live peaceably on the plan of complete indifference; he is tiresome sometimes in making the nests untidy with feathers, and sitting and screaming when he is hungry, but he scarcely ever screams now as he did when an infant. I have put up a perch in the outer wired place, and he sits there occasionally. A few days ago a friend sent me a pair of brown and black guinea-pigs; I thought I would have a sort of happy family. I have had an old wine-case turned into a little house for the pigs, with a little hole for them to come in and out just as they please, and have the run of the fowls' little yard, the same as Pharaoh has. That wise prince has discovered the luxury of the warm box, and actually goes in at the little door and sits in the hay with the two poor little guinea-pigs. I only hope he may be a safe friend for them.

Pharaoh has never killed anything himself except a black beetle, and that we had to push back every time Pharaoh missed his mark. At last he struck it with his beak, took it in his claw and ate it like a small sweet-cake.

I have mice now for him, and plenty of birds are shot for him by our farm man. He had a rook once that lasted some days: it was extraordinary to see him pull off mouthfuls of feathers and eat them. I once watched him eating a starling; he pulled off the head first, and swallowed it; it looked so strange to see the starling's long sharp beak gradually disappearing down Pharaoh's beak, which is very little larger. He eats a mouse whole generally, unless it is a very large one, and then he will sometimes take off the head first. I took him to pay a call the other day, and a friend gave him a specimen of the long-tailed field-mouse; Pharaoh with jerks and throwing back his head swallowed the fat body of the mouse, and then with half-closed eyes and swollen nose (which are always his characteristics when he has had plenty to eat), he sat on a wooden chair in my friend's room, the long tail hanging gracefully from his beak. The tail grew gradually shorter, but it was some time before it disappeared entirely.

The orifices of Pharaoh's ears are very large, and hidden in the thick grey feathers of his face: his hearing is very acute. I was sitting in-doors one day with him, and he turned suddenly and made his little quick caw-like noise and stared out; I listened, and after a minute could hear a faint step on the gravel a long way off, gradually coming nearer, and Pharaoh watched carefully till some one passed the window. He knows if he sees any creature for the first time, and looks at it with great attention. When we first came here, I took him to see the pig. He followed every movement of the pig with his great surprised eyes, and whenever the pig grunted Pharaoh made a little observant remark. The next time I took him he did not notice the pig more than a moment, but sat on the wall of the sty, and stared the other way. He can turn his head so as to look down the middle of his back; but the thing it is most curious to see him do, is to twist his face gradually round till his chin is exactly in the place where the top of his head should be by nature. He does this when he is looking at anything in a very scrutinizing manner and cannot understand it, or thinks a bird is being brought for him.

I think an owl about the most companionable bird any one can keep. This spring there will be, no doubt, a fresh supply of owls in the market, or in their country homes. It is well worth while to bring one up; no taming seems necessary, no wildness seems possible to my Pharaoh, though I notice now and then a little disposition to bite strangers, particularly gentlemen; but if any one speaks gently to him before touching him, there is never any difficulty. Pharaoh is a wonderfully nice bird; he adapts himself to any circumstances; he lived for three weeks in a green-house, looking beautiful upon a vine-stem, and generally sitting close to a hot-water pipe, but he came back contentedly to his little draughty fowl-house in winter weather, where one would almost have fancied—

"The owl for all his feathers was a-cold."

M. A. D.

SMELTS AND SMELTING.

THERE are few of our readers who have not enjoyed that most delicate of all delicacies—the Smelt. If they have not, we have no other feeling for them than that of profound pity, tempered by envy at their prospective enjoyment. Not to have partaken of this fish, is to be ignorant of how appreciative is the human palate.

Were you, gentle reader, to make your appearance in "what used to be" the ancient city of Norwich—as a local magnate unwittingly termed it—you would see the process of "smelting" going on every night with considerable energy. Do not fall into the error that something *metallic* is here meant, and that your eyes would be greeted with a "Black Country" sort of appearance. We are referring to fishing, not to iron or steel manufacture. At the head of the river Wensum is a place called the New Mills, where the water from what is called the "Back River" has to pay toll in the shape of turning large water-wheels before it is allowed to emerge. This part is very deep and tolerably broad. The sides of the river are flanked all the way down by quaint, peaked cottages or granaries, whose warm, red tiles look remarkably picturesque. Here and there the barges peculiar to Eastern counties rivers, with their single tan-coloured sails, are moored to the quay. The water boils and surges into foam, and at night the effect is heightened by about a dozen flat-bottomed boats, to the sides of each of which a large oil-lamp is attached, whose flame is spluttering and flaring, and casting its yellow glare over the water, giving to the scene quite a Rembrandtesque effect. You have not to wait long before you see that each of the men in the boats is clothed with home-made oil-skin garments, and that he is armed with a fine-meshed net, to which a rope is attached. This is a "cast-net," and every now and then you observe him gathering up the net over his left arm, and with his right, making a move or two before he throws the whole away from him. The result is that the net falls on the surface of the water in a regular circle; the rope is attached to the centre, and around the edges are a series of perforated leaden bullets, which immediately sink the net to the bottom, causing it to inclose any fish that may have been attracted to the spot by the glare of the light. And this is the way in which the Smelts are obtained.

The Smelt (*Osmerus eperlanus*) comes up the river Yare from Yarmouth every spring to spawn. Yarrell mentions that in some parts of England this fish inhabits fresh water from August to May. We know not how this may be, but are certain that along the Eastern coast their fluviatile migrations end when Yarrell says they begin. On the night of the 10th of March the smelters commence their work. As regularly at the end of April the smelt-fishing is over. It seems a pity that this fish should be so largely taken when full of spawn, for nobody attempts to catch it when the season is over, and, early in May, you may see shoals of them, thin, emaciated, and shotten, hurrying down to the sea. In the numbers which arrive considerable variation occurs; not unfrequently, three or four smelters will be out the whole night, and not take more than a dozen fish among them. The labour of "cast-netting" is considerable, for when wetted, the net weighs twenty-five pounds, and a smelt-fisher's patience must rank next to that of Job, or he would never make one throw after another without taking a fish! On other occasions he may take a score or two at a single cast. As the market price is about three to four shillings a dozen, there is considerable of the gambling spirit imported into the fishing. Who knows but the next throw may be worth five shillings? And thus the patient fisherman is deluded into making a night of it, always intending to go home after he "has had just one more cast"! A good deal of this uncertainty is due to the fact that about twelve miles down the river, nets are now drawn across, so that only those which get through the meshes find their way to Norwich. The men in the latter place grumble sorely, but they are unable to help themselves.

Fig. 67. Scale of Smelt, × 16.

We have known the smelts to come up in such numbers that it was easy to detect the peculiar *cucumber* smell which distinguishes them, by walking along the river-side! This odour is supposed to have given them their name. Perhaps the circumstance of this fish entering fresh water elsewhere at a different season of the year may be due to local causes. Dr. Parnell mentions that it ascends the Forth in

March, and deposits its yellow spawn about two miles below Stirling bridge. It is singular to find that, as a rule, the females preponderate considerably over the males in numbers, the latter coming up the river a few days later than the former. A fish often sold in the fish-markets as the true Smelt, is in reality the *Atherine*, or "Sand Smelt," which seems to be peculiarly marine. Its flavour is slightly like the true Smelt, but not so powerful or so agreeable. Anatomically it is distinguished by the firm rays in its second dorsal fin, the true Smelt possessing only a small adipose and somewhat rudimentary fin instead. In fig. 67 we have engraved the scale of this fish.

The Norwich smelters have a peculiar custom: most of them are dyers by trade, and endeavour to pick up a little money by smelting at night. Of course, after a good night's work there is usually little dyeing done on the morrow! In some of the families smelting has very likely been carried on for generations. The men have certain rules, which allow only so many fishers to go out at a time; whilst each man takes his turn at the best "holes." They regard amateurs or outsiders with the greatest suspicion, although anybody who likes can fish if they choose. But that universal British solvent called "beer," will do anything, and melt even the heart of a smelter! In this way you may get permission to be in his boat, or may draw yours alongside and try your luck at a cast. Supposing the attempt be your first, the odds are that in casting the net you will yourself follow it before you are aware! J. E. Taylor.

THE CUCKOO.

I HAVE often seen and heard descriptions of the nesting habits and peculiarities of this interesting bird, but I have a theory of my own on the subject, which I have never seen stated elsewhere, and which rests upon facts within my own observation.

When I was a boy, I lived on the border of a furzy down, covered with gorse, fern, and heath, and therefore of course patronized by those pretty little birds, the Stonechats. In the nest of one of these, a cuckoo deposited an egg, which in due course developed into a birdling, the mingled pride and terror of its foster-mother. While it was in this state, my sister and I discovered the nest; and, from the disparity between its size and that of its fellow-nestlings, we concluded that it was a young cuckoo. We of course communicated the tidings to our other sisters and brothers, and scarce a day passed but one or two of us visited the nest. One morning when I went, accompanied by my sister as before, what was our horror to see four little dead birdies lying on the ground outside the nest, and the young cuckoo, with another on his broad back, conveying it, the fifth and last, to the edge of the nest, and then deliberately heaving it over. I was then too young to notice much, but this scene made such an impression on me that I don't think I shall ever forget it. When the young cuckoo was fully fledged, we caged it, and it survived until November, but then it died, owing either to the coldness of the climate or to its migratory instinct being thwarted.

Last summer I was going for a walk, and sat down on the side of a hill where I was nearly hid from observation. While enjoying the sunshine and the view over the sea, I heard the cuckoo. I looked round, and presently saw two birds in a field about 100 yards distant, and watched them for some time. After flying about the field, playing with one another for a few minutes, one of them flew up into a tree close by, and commenced repeating his note, which ended, I noticed, in a guttural "cucka-cuck," quite distinct from the usual "cuckoo." The only analogous sound that I can think of, is a turkey's note of defiance.

When this bird had seen whether the coast was clear, he and his mate (whom, by the bye, I did not *once* hear repeat their peculiar note, which makes me disposed to believe that the female cuckoo is mute) flew to the hedge close by me; and, after a while, the female quitted the hedge, and flew over my head towards the brow of the hill, while her mate continued to repeat his monotonous strain, varied with an occasional cucka-cuck. In a few minutes she returned, followed nearly to the hedge by a bird, which, as far as I could see, was either a lark or a meadow pipit. I had seen this occurrence frequently before, and my curiosity was aroused, so I came out of my hiding-place (much to the surprise of the pair of cuckoos, who beat a precipitate retreat) and walked in the direction in which I had seen the cuckoo fly, in the expectation of finding a lark or pipit's nest, and therein a cuckoo's egg. Nor was I mistaken; for, on looking about, after a very short search, I found a pipit's nest with a cuckoo's egg quite warm in it. This egg, with the help of a pin, I at once proceeded to blow; but what was my astonishment to find that, instead of being, as I thought, fresh laid, the bird was quite formed, and just ready to burst the shell. This incident gave me a notion that cuckoos were not quite such careless and heartless mothers as naturalists have represented them to be, for I conjectured that this cuckoo's object must have been to see how her offspring was getting on. I determined to observe the next cuckoo or cuckoo's egg that I came across, and indeed I was heartily sorry for having destroyed the egg which I had just found.

I was one evening, about seven o'clock (it was almost midsummer) searching for the nest of a grasshopper-warbler, whose note I had heard in a certain field on several successive evenings. While thus engaged, I saw a cuckoo, followed by a grey wagtail, flying over a neighbouring wood. After a few minutes the wagtail returned, and I went in that direction, but failed to find her nest. On the following evening I was again engaged seeking the grasshopper warbler's nest, and I again saw the cuckoo pursued by the wagtail. Once more I sought for the wagtail's nest, and again failed. Next year, however, I hope to meet with better success, and to ascertain for a fact whether or not the custom of the Cuckoo is to visit its eggs and young periodically, and, if so, how often. I should be much obliged if some other lovers of natural history would help me. I should take great pleasure in vindicating the character of the Cuckoo from the charge of deserting its young to the mercies of strangers.

I have heard it said that the physical conformation of the Cuckoo incapacitates it from the work of incubation, and that, consequently, its maternal instinct teaches it to deposit its eggs to be hatched in the nests of other birds. According to my idea, it would seem a painful blot on the Cuckoo if it did not feel anxious for the welfare of its young, and manifest its watchfulness and care by frequent visits. I would much rather believe that the Cuckoo pays daily visits to its eggs and young; and, when they are all fledged, gathers them, though reared in different homes, into one family, and then takes them, under its fostering care, to distant lands. G. E. R.

THE GLASS-ROPE SPONGE.

IN the April part of the "Annals of History," Dr. E. Gray has the following strictures on my papers on *Hyalonema* in the February and March numbers of SCIENCE-GOSSIP :—

"Mr. F. Kitton makes some remarks on Palythoa investing the Glass-rope Sponge, and figures some of the animals growing on the surface of a ray's ova-case, evidently considering that this proves their parasitic nature. He mentions a second case in which they are growing on a riband frond of some species of Algæ. I regard both these instances as proving just the contrary—'the Alga had become entangled with the glass-rope.' The egg-case of the Ray is often to be found attached by its elongated ends to the glass-rope. I believe the figure only represents some of the eggs or buds of the Palythoa growing on its surface, to which they have become accidentally attached, and that they will never come to perfection, so as to form a crust or develop the rope-like spicules.

"My reason for believing this to be the case is, that the polyps are more isolated; they are of different sizes, some being very small; some are crowded one upon the other, so as deform their shape, very unlike the uniform crust they form on the glass-rope; and I have no doubt of their being incapable, from their position, of developing the usual rope.

"Mr. Kitton states that the examination of the Palythoa, when found apart, has enabled him to ascertain the spicules peculiar to it. Figs. 24 and 25 of his previous paper appear to be the only forms of spicula really belonging to the Palythoa. He omits to state that the spicules are siliceous, like the other spicules found on the rope and bark of *Hyalonema*, which have not hitherto been found on Palythoa; and the two forms he mentions from a polyp only differ from those found on other parts of that coral in being thicker and more spinous.

"In a previous number of SCIENCE-GOSSIP, Mr. Kitton figures *Hyalonema*, fig. 19, with its parasitic sponge and the various spicules he has observed in different parts of it (figs. 21—31). These figures are good, except fig. 20, representing the ends of a broken fibre of the rope. He does not seem to be aware that *Hyalonema* is more common without its parasitical sponge at the top than with it; but the specimens with the sponge were formerly more sought for by travellers, and brought to England, whilst the Russian specimens, being collected by naturalists, were chiefly without this parasite, and now we constantly receive them without any appearance of sponge covered with living polyps up to the tip."

In reply to the remarks which Dr. Gray has done me the honour to make on my papers, I beg to say that I am still unconvinced of the parasitic nature of the sponge, or that the Palythoa is non-parasitic.

Until I saw the specimens belonging to the Rev. J. Crompton, I was very much inclined to believe that the Palythoa was an integral portion of the sponge; but when I saw it growing on the alga as stated, and this not entangled on the glass-rope, but carefully twisted round it, and below it some fine twine, I could only come to the conclusion that the long anchoring spicula did not belong to the Palythoa. The ova-case of the Dog-fish was attached to the glass-rope by one of its long tendril-like filaments, but the rope itself had none of the Palythoa growing upon it: in both cases the crust and tubercles were as well developed as when growing on the glass-rope.

Dr. Gray says I omit to state that the spicules in the Palythoa are siliceous; if, however, he will refer to my first paper, he will find I particularly allude to their siliceous nature, considering that to be evidence of their spongeous origin.

My reasons for considering the sponge and rope as one organism, are, that many of the forms of spicula occurring in the heads of the sponge are also found between filaments forming the rope, particularly the spiculate cruciform, the attenuated rectangulated, hexradiate, and (rare) the multi-hamate birotulate spicules.

The occurrence of long anchoring spicula in *Pharonema Grayii* and *P. Carpenteri* is, I should imagine, very conclusive evidence that the rope in *Hyalonema* is a portion of the head.

Dr. Gray says he supposes I am not aware that specimens of *Hyalonema* occur more frequently without than with its parasitic sponge. This is very probably correct; but they had no doubt lost the sponge, either from the decay of the sarcode or been pulled off by the dredger or diver; in the former case, the rope, when divested of its spongy head, would in all probability soon be invested by the parasitic Palythoa. Dr. Perceval Wright, who has had the opportunity of examining specimens in a living state, is quite satisfied as to the parasitic nature of the Palythoa.

Norwich. FRED. KITTON.

LAND-SLIP NEAR NORTHWICH, CHESHIRE.

A FEW weeks ago the writer went in search of a reported land-slip in the salt district of Cheshire. An occurrence of this sort is not unfrequent in the neighbourhood of the Salt-works, as those who happen to live near them know to their cost; and any one traversing the narrow, tortuous, and unpicturesque streets of Northwich may see the results of minor sinkings of the land, in houses whose walls bear marks of "faults," one part having slipped, leaving rents from basement to roof; others, whose windows are all awry, presenting a somewhat grotesque appearance. This sinking and disturbance of the laud are caused by the salt-mining operations carried on beneath.

The salt-beds occur in what geologists denominate the Triassic formation, from its tripartite character, and it is in the red clays of the upper group of rocks in which salt is found, either in a state of solution as brine, or in masses of pure rock salt 90 to 100 feet thick. Beneath these lie the well-known "water-stones," bearing the ripple-marks and reptilian impressions.

Arriving at Northwich, I learned that the place of which I was in quest lay about six miles away, and close to the Whitegate station, on the line from Northwich to Winsford. Proceeding thither, I found the object of my search in among the fields, which are all used for agricultural purposes, and belong to the adjacent farm of Marton Hall. One of the peculiarities of this land-slip is its distance from any salt-works, the nearest being at Winsford, about two miles off.

The chasm, which is almost of a circular shape, is upwards of 300 yards in circumference, and about 60 or 70 feet deep; the sides are remarkably steep, and expose the reddish clay of which the whole of the land-slip is composed. At the bottom lies a lake of water of a greenish hue, which is brine, and as the declivity was so steep and the clay wet from recent rain, I refrained from descending, having in my mind the "*facilis descensus Averni,*" and the fear of a sudden and undesirable pickling in the briny water below. The shape of the interior of the chasm is that of an inverted cone, or the empty crater of a volcano, and the first question that naturally rises to one's lips is, Where has the land gone? for here you have not, as in many land-slips I have seen, the earth or rock lying in confused and broken masses around, but there is not the remotest trace of anything that once stood there; hedges and trees all have disappeared into the bowels of the earth, and lie beneath the water that covers the bottom.

Before offering an explanation of these curious phenomena, I must premise that most of the salt used for culinary purposes in England is made from the brine, which is pumped up from the brine-holding strata beneath; and we may fairly presume that the district for miles round the actual workings is thus being gradually drained. Supposing then that water percolating through the overlying beds, or some system of underground drainage, has come into contact with the deposit of rock salt, this would in course of time be dissolved, and, as the district becomes drained of the brine, leave hollows or caverns; and presuming some weak spot in the superincumbent beds of clay overlying one of these hollows or caverns, one can easily imagine the clay gradually falling away and taking the place of the original salt-deposit, until at last the surface land, not having sufficient support from beneath, has fallen bodily into those presumable subterraneous caverns, which originally were filled with salt. M. S.

THE SAFFRON (*Crocus sativus*).

A SHORT note drawing attention to this Eastern plant having appeared in SCIENCE-GOSSIP for December, will you grant me space for a few details?

Although this crocus is found in a wild state on the sunny plains of Italy, it most decidedly has been traced to the East originally.

It is one of the plants mentioned in the garden of the Wise King (Cant. iv. verse 14), and the Arabs of the present day value highly the virtues of their *Zafran*.

The flowers are lilac-coloured, the stigmas a deep orange; and these stigmas, with a portion of the styles, afford the saffron of the shops.

The saffron crocus was first cultivated at Walden in the time of Edward III. by a Sir Thomas Smith, and the place was henceforward kuown as Saffron Walden.

If you want to grow saffron, you should plant the bulbs in July, in rows. The soil ought to be rich and light. About the third week in September you will see the leaves appear in little delicate tufts; they grow immediately from the bulb, and are enveloped in a thin membrane or sheath. The flowers proceed from the leaves on a very short scape, and may be expected to bloom early in the month of October. They will come up in succession for a month, six or ten, or even more, from one plaut; and, to insure fine saffron, ought to be gathered early of a morning, the stigma and style picked out and dried carefully in the sun.

The leaves keep green in winter, but die off in May; so a saffron-bed looks very bare and ugly from this month until autumn.

English saffron is considered the best. The Spanish *Azafran* is dipped in oil to preserve it, and this is supposed to take from its value.

Saffron is a favourite remedy with old women for "lowness of spirits" (for diseases which medical men would at once recognize as nervous), but it will in some constitutions produce most undesirable effects, and make the before crying patient burst into fits of excessive laughter, reminding one of those very remarkable pictures which so often accompany the advertisements of "an immediate cure for the toothache."

The scent of the Saffrou was highly valued by the ancients. Virgil mentions "saffron odours." He also says bees love to feed on this flower.

"Et cum scena croco Cilici perfusa recens est," writes Lucretius; and Pliny also says that wine in which saffron had been steeped was sprinkled in theatres, the saffron growing in Cilicia on Mount Corycus being the finest of all.

The Hebrews call this plant, or the produce of it (for I am not quite certain which), *Karkom;* and I read in a book of Eastern travels lately that a lilac flower exactly like this crocus grows on the bare dry sand near "Wady Ramleh."

The Meadow-saffron is a different plant; from it colchicum is produced: and we likewise have an early purple crocus—the *C. vernus*, or spring crocus; but neither of the latter possesses any medicinal virtues, I believe. HELEN E. WATNEY.

SUPPOSED PARASITE OF ELM.

THE above was found under the bark in company with *Clausilia*, and its description is as follows:—

The tongue, armed with closely-set recurved teeth, and evidently trifid, traversed in its entire length by a narrow channel, is apparently designed to penetrate and extract the juices of the softer and decayed parts of the bark. The whole apparatus is

Fig. 68. Tongue of Parasite.

represented in fig. 68; the three parts being folded

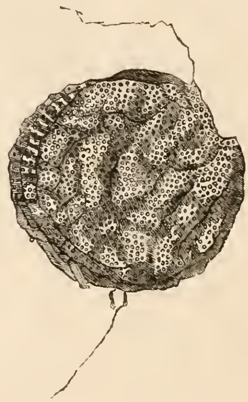

Fig. 69. Pygidium of Parasite, × 160.

together. Two projecting toothed processes are

Fig. 70. Feet of Parasite.

Fig. 71. Supposed Parasite of Elm, × 40.

also shown, × 160. The upper part of the figure gives the connection with the cephalic segment. Fig. 69 represents one of the two (pygidia ?) × 160. The surface next the eye (ventral) is in focus the indistinct hexagonal areolation belonging to the dorsal side of the organ. The minute dots represented give the object a delicate beauty of aspect, very difficult to reproduce in a drawing.

Fig. 70 gives a representation of two of the feet, (1) in which the unci are well developed, and the pulvilli comparatively small, belonging to the first pair of legs; (2) which shows the pulvilli much more conspicuously, the unci being very small, appertaining to the third pair. The feet are drawn to the same scale as fig. 69. Fig. 71 shows the entire insect × 40 diameters, mounted in balsam. It is hoped that the description and drawings may lead to the identification of this possible stranger.

CHARLES E. BURTON.

INDIAN ANT JOTTINGS.

By CHARLES HORNE, late B.C.S., &c.

WHEN I was young I read in Proverbs vi. 6, "Go to the ant, thou sluggard; consider her ways, and be wise, which having no guide, overseer, or ruler, provideth her meat in the summer, and gathereth her food in the harvest."

Hence I inferred that all ants were thus provident, not being then aware that many species appear to remain all the winter in a dormant state of hybernation; nor had I until very lately heard of any grain-storing European ant. At a late meeting of the Entomological Society of London, a communication was read from a gentleman at Nismes, South France, recording the habit of some ants in storing grain, seeds, &c., near that place. To prove it, he had scattered some hempseed near, and they had been carried into the nest, and shortly afterwards he discovered their husks outside. I think he added that in some cases, before storing, the germs had been bitten out, which would argue great foresight on the part of these intelligent little creatures; but be this as it may, the fact of storing was fully proved.

At our last meeting there was a further note from the same gentleman from Capri, still farther south, where he had observed similar habits in ants.

But my notes carry me to the far East, where I often watched this most interesting class of insects, and briefly recorded my observations, unfortunately cut short by illness, and the necessity of return to Europe, which must be my apology for their want of completeness.

But before transcribing, I would remind my general reader that all ants may be seen carrying off food to their nests for present consumption, and that this food consists of a great variety of substances. This is disposed of inside the said nest, being often masticated and the juice extracted by the workers, and then given in an inspissated form from their mouths to the young grubs, which are in general tended by their nurses with the greatest care. It is indeed very curious to watch this feeding process; but to proceed.

Under date Nov. 7th, 1866, I find in my natural history note-book as follows: — Mainpuri. This morning as I was walking across the "Oosur," or waste plain, where it was very sandy, being cut into small ravines, and clothed only here and there with fine grass disposed in clumps, thus forming little hillocks of sand blown by the wind, and arrested in its course by the grass, I came across a long line of ants, travelling four deep, some coming empty, and others laden each with one grass-seed on their way home.

I followed up the procession to the nest, which was subterranean, and at the mouth of which on the level plain there was no trace of elevation caused by the soil brought up from below, owing to the habit of these ants of taking each grain of sand to some distance along their road, and depositing it on one side or the other.

There may have been five or six entrances to the nest, in and out of which a prodigious number of ants were passing, the species of which has been described by Dr. Jerdon. They were of a medium size, shortish bodies, and of a reddish-brown colour, —*Podomyrma rufo-nigra*, Jerdon. Around the mouth of the nest, forming a circle of perhaps eighteen inches in diameter, was a space beaten flat, and kept clear by these said ants, from which radiated in every direction thirteen roads, each about four inches in width for about 30 to 40 yards, when they branched off and became narrower, being ultimately lost amongst the grass roots. These paths were fairly straight; they did not cut through elevations, but went round them.

From a careful examination, it appeared that they had been cleared of all obstacles, such as small stones, twigs, &c., but that their smoothness resulted only from the tread of countless feet.

The bearers of burdens took the seeds *into* the nest, which I did not dig up, and certainly stored them there, after having prepared them, probably by the removal of a portion of the outer husk. Of these husks there were large collections near the entrances to the nest, all carefully set aside by the ants.

In times of famine, I am told, not only are the nests rifled of their grass-seed stores, but these heaps of apparent husks are collected and ground with other grain to eke out a subsistence.

This kind of grain has a name, "Jurroon," derived from "Jharna," to sweep, literally, sweepings. I much regret that I have not preserved specimens of this "Jurroon," for it is very unlikely that the ants after taking it to their granary, should again throw it out, and yet, if grainless, what benefit could there be in eating it? The season of the year when I observed them (November) is the beginning of the cold weather, and no rain would probably fall (excepting a little at Christmas) till next May or June. Later on seed would be rare; and how the nest fares at a time when floods of water often pass over the plain I cannot conceive.

It is clear that some escape, and we know with what prodigious rapidity these colonies increase. But these jottings have been recorded merely to show how this species of ant store grain against a time of scarcity, and fully bear out the statement in the text with which I commenced this paper.

MICROSCOPY.

Pitchstone, Porphyrine, &c.—One of the most interesting of volcanic products to the microscopist is the variety of pitchstone found in the Isle of Arran. When thin sections of this material are examined with a two-thirds or half-inch objective, beautiful dendritic forms will be found permeating the vitreous mass. The casual observer is apt to declare that these frond-like forms are fossil mosses, and is unwilling to believe that they have

Fig. 72. Section of Pitchstone.

a crystalline origin. The pitchstone from the Isle of Arran differs from obsidian, in containing a variety of crystalline minerals; the beautiful dendritic forms are produced by the acicular crystallization of pyroxene. These crystals are either isolated or combined; in the latter condition, they appear like microscopic ferns, fronds, or tufts of Batrachospermum entombed in glass. The transparent material in which these crystals occur consists of vitreous matter formed within the great volcanoes of the Miocene epoch; and the melted mass, slowly cooling, allowed the crystalline elements mixed with it to crystallize. According to Dana, pitchstone is composed of albite or oligoclose, rather than orthoclose, that is, it contains soda, or soda and lime, instead of potash: its chemical constituents are silica, alumina, iron lime, and soda. Porphyrine is an artificial production, and is introduced here as an illustration of the production of crystalline forms when molten vitreous matter is allowed to cool slowly. This substance is of a beautiful crimson colour, and is said to be manufactured only in Russia, where it is used for mosaic-work: its composition is asserted to be a secret. As a microscopic object, it appears to be little known, probably owing to its

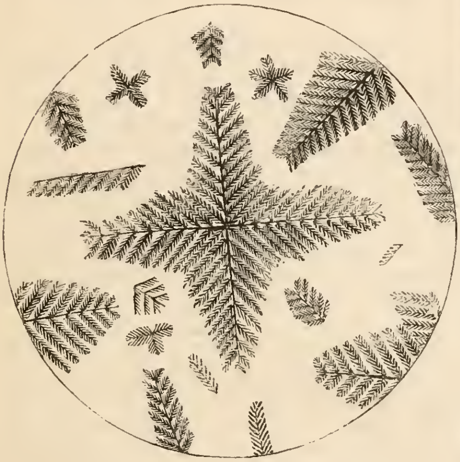

Fig. 73. Section of Porphyrine.

scarcity: under the binocular, I know of few objects that can compete with it. The beautiful fern-like crystals embedded in the transparent base would alone interest the observer; but, in addition to this elegant outline, the fern-fronds are of a beautiful crimson colour. The most effective way of viewing them is with a two-thirds objective, and Lieberkühn. Many very beautiful crystalline forms, adapted for microscopic observation, may be produced by means of the blowpipe. The following is the plan recommended by Mr. Sorby, F.R.S.:—A small quantity of borax is mixed with some mineral salt or oxide, and a little of it placed in a small platinum ring of about one-eighth inch diameter, and then fused with the blowpipe. After fusing, the bead is to be kept for some little time at a dull red heat; when cool, the ring containing the bead may be cut off, and the whole mounted in Canada balsam. The author advises the use of a four-tenths objective for the examination of the crystals. The following salts and oxides produce beautiful crystalline forms:—borate of magnesia, zirconia, theolite (native tungstate of lime), molybdate of strontia, apatite, native phosphate of lime. A full description and figures of the crystals will be found in vol. i. of the *Monthly Microscopical Journal*, p. 347.

New Microscopical Journal.—We have received the first number of a new journal of natural history and microscopy, published in Chicago, under the name of *The Lens*. The principal paper in it, however, is taken from the *Monthly Microscopical Journal*—illustrations as well. A little leniency may be shown to this common transatlantic fault, on account of the great fire. We congratulate the editors on so soon recovering the loss then inflicted.

On Staining Tissues.—It is desirable to stain sections of all soft tissues, whether from healthy or diseased specimens. First, because it enables us more accurately to distinguish germinal or nuclear matter from formed material, or tissue proper, by their differences in receptivity of colour; and secondly, because it brings into relief all constituents of soft tissue, and therefore renders their study easier and more satisfactory. The staining material which aids me most, and therefore suits me best, is the alkaline solution of carmine made after Beales's formula. The sections should be placed in the carmine solution as soon as they are made, and they should be made as soon as possible. No positive rules can be laid down as to the precise time required for the completion of the staining process. It will vary, within certain limits, according to the character of the tissue and alkalinity of the solution. In regard to this latter point, I may properly say that the carmine solution should neither be neutral nor intensely alkaline: in the former case, all portions of the tissue will probably be stained alike; in the latter case, much of the younger or softer portion of the formed material surrounding the germinal matter will be destroyed by the excess of alkali. I generally permit my own sections to remain in carmine for three or four hours. Having completed the staining process, the sections should next be immersed in a mixture composed of Price's or Sarg's glycerine and distilled water, āā ʒiv., acetic acid gtt. xx. This answers the double purpose of rendering the so-called nuclei (germinal matter, bioplast) sharp and clear, and of commencing the process of impregnating with strong glycerine; it will also remove the superfluous carmine. After being soaked in the glycerine and water mixture for from twelve to twenty-four hours they should be transferred to the following mixture: purest and strongest glycerine, ℥i.; pure acetic acid, gtt. v. They should be allowed to remain in this mixture until they are fully saturated therewith. This will take from two days to as many weeks. —*J. N. Danforth, M.D., in the "Lens."*

ZOOLOGY.

A Parasitic Rotifer? In some water taken from a pond near this place last Christmas, I found a few days ago several specimens of Daphne covered with a species of Rotifer, of which the following is a sketch. The power used was a quarter-inch. If

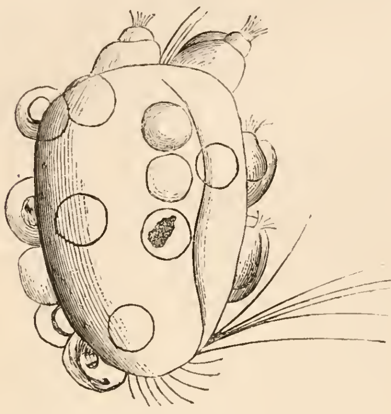

Fig. 74. Parasitic Rotifer (?) on *Daphnia.*

you or any of your correspondents can enlighten me as to the name and habit of this rotifer, I shall be much obliged, as it is quite new to me, and I can find no mention of it in any work on Infusoria which I have at hand.

A British Turtle. — A young Hawksbill Turtle (*Chelonia imbricata*) was a few days ago exhibited in the streets of Hastings. It had been caught by a fishing-boat thirty miles off Beachy Head. The occurrence of this turtle in British waters is of very rare occurrence. The carapace of this individual was about a foot long.—*A. W. L.*

Reptile Hygroscopy.—Toads have a fine appreciation of moisture in the air. Near the writer's residence is a sheet of water, situated on the top of a hill. In spring great numbers of toads come from the fields around and make for the pool, no doubt made aware of its proximity by their hygroscopic sensibility, and designing to deposit their ova at its margin. Unfortunately for themselves, they are not able to ascend the fence in question, and so fall victims in numbers to thoughtless boys.—*R. G.*

Popular Science.—The last number of the *Popular Science Review* contains several capital articles, from the pens of some of our most eminent scientific men, all of which will be read with great interest. Among them are papers "On the Structure of Camerated Shells," by H. Woodward, F.G.S.; another on "The Temperature and Movement of the Deep Sea," by Dr. Carpenter; one on the "Physiological Position of Alcohol," by Dr. Richardson; and the last "On the Nature of Sponges," by H. J. Slack, F.G.S. In addition to the above are other articles by R. A. Proctor and S. J. Mackie, on the "Eclipse of last December," and "The Lithofracteur."

Marine Aquaria.—The success which has attended the foundation of a marine aquarium in the Crystal Palace has induced a number of gentlemen to start a company for the purpose of establishing one in Manchester. A site has already been obtained in the vicinity of Alexandra Park, and the aquarium at Sydenham will be taken as a pattern. It will be a promising feature in the future education of youth, when one of their amusements in every town and city will be an introduction to the many strange forms which inhabit the dark caves of ocean.

North American Hymenoptera.—Mr. E. T. Cresson has commenced, in the February number of the *Canadian Entomologist*, a series of descriptions of North American Hymenoptera. The first part begins the family Ichneumonidæ, with the genus *Mesochorus*. By the statute of incorporation, the Entomological Society of Ontario is required to furnish the Commissioner of Agriculture with an annual report of insects noxious or beneficial to agriculture, and the last report of this kind is now announced as ready.

New Species of Sericoris.—Mr. C. G. Barrett has described, in the *Entomological Magazine* for March, a species of *Sericoris*, allied to *Cespitana*, which is new to science. Its habitat is in Ranworth Fen, Norfolk, in July. Mr. Barrett has named this new species *Doubledayana*, in honour of Mr. Doubleday, the well-known entomologist.

Saw-flies and Water.—A communication has been made to the Entomological Society by Mr. P. Cameron, to the effect that the gall-making saw-flies avoid those parts of willow-trees that overhang water, on account of the impossibility of the larvæ descending for the purposes of pupation in the earth. A similar fact has been recorded with regard to the American plum-weevil.

Fresh-water Polyzoa.—Mr. Stewart recently explained to the South London Microscopical and Natural History Club that he had succeeded in killing Polyzoa with the tentacles expanded, by adding a few drops of the best French brandy to the water in which they were living. He supposed they were overcome by the liquor before they could draw in their tentacles.

"The name 'Lory' has been given to this tribe of Parrots because they have the habit of saying the word 'Lory' over and over again."—"*Beautiful Birds in Far-off Lands.*"

BOTANY.

Chlorophyll in the Lower Organisms.—Professor Famintzin has communicated to the Academy of St. Petersburg a paper on the use of inorganic salts as an important aid in the study of the development of the lower chlorophyll-containing organisms. His solutions were made with a view to tracing the kind and amount of variability in the development of the lower *algæ* under cultivation. Among other means he employed a solution of lime, potash, and magnesia, in which he found algæ developed with remarkable freedom.

Colouring Matter in Fungi.—Mr. H. C. Sorby has determined the existence of at least thirty distinct colouring substances in fungi. The majority contain at least two, and many of them several, different kinds. Twenty of these have such well-marked optical qualities that they could be recognized without difficulty in other plants, but only one of them, a fine orange-colour, is known to exist in any plant not a fungus. As far as Mr. Sorby's observations extend, there is little or no specific agreement between the substances found in fungi and those met with in algæ and lichens, though the two latter orders are closely related in this respect.

The Passion-flower.—The earliest passion-flower introduced to the Old World is *Passiflora incarnata*, in 1629, from North America; but the universal favourite, *P. cærulea*, was not known here till 1699, from Brazil. Hence it is vain to expect a pre-Reformation example of this genus. Yet from the pertinacity with which decorators use this flower, especially at Easter-tide, it is evident that they assume it to have been a sacred emblem. I have been told the following is the interpretation given to the various parts of the flower. The columella is typical of the scourging-post; the 10 petals and 3 sepals, the thirteen apostles; the 5 stamens, the five wounds; and the 3 stigmas, the nails. The crown of thorns is represented by the inner circle of rays, and the crown of glory by the larger circle; while the leaves are emblematic of the open hand that struck the blow; and the tendrils, the scourges and bonds. Yet an authority, erroneous though it may be, must exist, for this wide-spread use of the ornament; and this it seems is the Rose-en-Soleil, the favourite badge of Edward IV., and used so repeatedly by him and his partisans. The badge is frequently to be met with in quarries of church glass; and the colour being yellow and outline only, it bears a considerable resemblance to the common Passion-flower, especially when on greenish glass. I have seen it in the church of St. Martin at Palace, Norwich, and also in Ely Cathedral, and was there told by the verger that they were passion-flowers. At Martham, in Norfolk, the carver has used the *P. cærulea* as his model with considerable success as an ornament.—*T. G. Bayfield.*

The True Shamrock.—St. Patrick's day has passed and gone, but I have not till now had an opportunity of putting a query which perhaps some of your correspondents may be kind enough to answer for me. In the first place, what kind of plant may the so-called "*true Shamrock*" be? and secondly, what might be the supposed derivation of that word? for concerning the right answer to these two questions, a vast deal of uncertainty seems to prevail in the minds of people in general. Now, if we take into consideration that there are, as I believe, somewhere about a hundred and fifty species of trefoils, some being perennials and some annuals, and that the colour of the flowers varies from dark crimson, and sometimes scarlet, to purple on the one hand, and to white, cream-colour, and pale yellow on the other, it will be perceived that it is somewhat a difficult task to point out accurately which may be the said "true Shamrock." Of course, any one species would do as well as another to illustrate the doctrine of the "Trinity," and as far as that goes, there need be no preference given to one especial kind at all. I remember, when residing in England some years ago, having a small plant sent over from Ireland by a friend, of what he termed true Shamrock (we had plenty of what, to my uninitiated eyes, looked like shamrock growing on the lawn),—*that*, however, he called *clover*. Great care being taken of this true shamrock; the result was that in about three weeks it could not be identified from the clover above mentioned. Since then I have doubted the propriety of singling out any one kind of trefoil as the veritable shamrock of St. Patrick.—*J. S. William Durham.*

Berries of Arbutus. — A fact in vegetable Teratology of which we have seen no notice, not in Dr. Masters's volume for instance, is presented by the little Arbutus (so called) with mucronate leaf, often cultivated in gardens. In early summer its red berries, whilst yet on the plant, will be found, when they are opened, to have their seeds in a growing state; that is, each one with green leaflets as well as radicle.—*R. G.*

New Fungi.—On the 6th of April I again met with the new Badhamia (*B. capsulifer*, B.), and I hope in a few weeks to meet with more of it, when I shall have pleasure in supplying any of my friends with specimens, as far as I can. Mr. Cooke's description, from Berkley's "Outlines of Badhamia," is as follows:—"Peridium naked or furfuraceous; spores in groups, enclosed at first in a hyaline sac." With the exception of a Badhamia on Jungermannia, which I have never met with, all others heretofore known to be British, have been found on wood.

The new one is to be found on the under-side of the leaf of *Petasites vulgaris*, known in this district as Butter-burr, and in some parts of the country is called wild rhubarb. The other new fungus referred to in SCIENCE-GOSSIP last month, and which I found at Chelford, Cheshire, I don't expect to meet with until mid-winter. I may add that I found *Uromyces ficariæ* and *Æcidium ranunculacearum* on the 25th March; these dates being unusually early.—*Thomas Brittain.*

GEOLOGY.

NEW FOSSIL BUTTERFLY.—The *American Naturalist* for March states that Mr. S. H. Scudder has discovered a new genus of fossil butterfly from Aix, which was deposited in the Marseilles Museum. The name given to it is *Satyrites Reynessii*. The specimen consists mainly of the two fore wings, the venation of which is very distinct. This butterfly is of the form and has the general appearance of *Portlandia*, although it is more nearly related to the East-Indian genus *Debis*. Butterflies allied to Indian species have been found fossilized in the miocene beds of Croatia.

FRANCE DURING THE JURASSIC PERIOD.—M. Saporta has come to the conclusion, from a careful examination of the fossil plants of the Oolitic or Jurassic epoch in France, included equisetums, ferns, conifers, and cycads, that that country enjoyed a mean temperature of 25° Centigrade—nearly the same as that now prevailing in tropical countries.

FOSSIL FISH IN PALESTINE.—Under the above heading, a correspondent (G. F. Warner) in last month's SCIENCE-GOSSIP, quotes a passage from an early history of the Crusades, descriptive of a stone from the neighbourhood of ancient Sidon, which inclosed a fossil fish; and he wishes to know whether there is modern evidence as to such remains being still found in Palestine. It will interest him, and possibly some of your readers, to know that the evidence is abundant and conclusive that many genera and species of fossil fishes abound in the rocks of the Lebanon. They have been figured and described by many authors, but chiefly by De Blainville, Agassiz, Kotschy, Keckel, Pictet, Humbert, Egerton, and others. The fossils are found in a limestone, which is easily split in the direction of its bedding, and it is referred to the Lower Cretaceous period. In nearly every layer a scale, or a bone, or a fish, in a more or less perfect state of preservation, may be found. The colour of the stone is yellowish; that of the organic remains (which include some small crustacea as well as fish) is a rich reddish-brown. Examples are far from uncommon in which the profile of the fish, with the bones and the fin-rays in their normal position, are most perfectly conserved; and occasionally groups of many individuals occur. Among the species are representatives of three of the four orders of fishes as founded by Agassiz; viz., Placoid, Ctenoid, and Cycloid; and probably among the undescribed species, of which there are several, a Ganoid may be discovered. More than fifty well-authenticated species have been described; those belonging to the Cycloid order are the most numerous, there being no less than nine species of Clupea or Herring. Specimens have for many years been preserved in public museums and in some private collections, both at home and abroad. The British Museum possesses a fair collection of these remains, among which is exhibited a specimen presented long ago to that institution by the eccentric Lady Hester Stanhope, who resided for many years in the Lebanon; and also some fine examples, some being new forms, from a large series collected by the Rev. H. B. Tristram during his scientific explorations in Syria and Palestine. If your correspondent desires further information respecting this subject, I would refer him to Pictet and Humbert's "Nouvelles Recherches sur les Poissons Fossiles du Mont Liban," 1866, where he will find a summary of all that has been written relating to it.—*W. D.*

AMERICAN MASTODON. — An interesting discovery has recently been made in the vicinity of Jamestown, New York. The remains of a skeleton of *Mastodon giganteus* was found imbedded in a post-tertiary deposit of peat and marl. The tusks were estimated to be twelve feet in length before they were much disturbed or broken. What is singular is, that, in proximity to the visceral cavity, a mass of *undigested food*, eight or nine bushels in quantity, was met with. The food consisted of shoots and twigs of pines and firs. The height of the skeleton is judged to have been fifteen feet, and its length seventeen or eighteen feet. It had six teeth, the largest of which weighed five pounds and a half.

NEW FOSSIL FISH. — Sir Philip Egerton has just described a new genus of fossil fish from the lias of Lyme Regis, to which he has given the name *Prognathodus*. Dr. Günther is of opinion that in its dentition it establishes an additional piece of evidence in favour of the connection between the Ganoid and Chimæroid forms.

A NEW FOSSIL BIRD.—Prof. Marsh has described the skeleton of a large fossil bird, standing at least five feet high, which he met with in the Upper Cretaceous deposits of Western Kansas. Although a true bird, it differs widely from any known recent or even extinct form. The name he proposes to give to it is *Hesperornis regalis*. In many respects, this unique fossil he considers to be most comprehensive in its relationships.

NOTES AND QUERIES.

SANDPIPERS.—It is not usual for any sandpipers, except the Purple Sandpiper, to do what "H. G. R." describes.—*G.*

SUGARING FOR NOCTUA.—Will some of the correspondents of SCIENCE-GOSSIP be kind enough to advise me how to make the best mixture for "Sugaring for Noctua"?—*H. Elliott.*

FIELD CLUBS.—The Leeds Naturalists' Field Club and Scientific Association meets every Tuesday evening. Rooms, Leeds Mechanics' Institution, Cookridge Street. President, Thomas Hick, B.A., B.Sc. Joint secretaries, James Brodie and Wm. D. Roebuck.

GOLDEN EAGLE IN SOMERSETSHIRE.—It is worthy of record that a pair of golden eagles were seen some years since in the extreme west of Somerset, above Porlock. One of them was killed on Oare Common, near Badgworthy Wood; and this bird, preserved and mounted, is now in the possession of Mr. Snow, of Oare.—*I. Gifford, Parks, Minehead.*

ERRATUM.—In "Canine Gyrations," page 52, eight lines from the bottom, instead of the words "may perhaps," *read* "can scarcely."—*E. C. L.*

HOUSE FLIES AND BLOW-FLIES (p. 94).—I take leave to doubt the assertion that, either in England or New Zealand, the former species would in any way assist in exterminating the latter. Where one is abundant, it may sometimes happen that the other is scarce or absent; but, frequently enough, both are numerous and annoying at the same time. How should one affect the other? Their larvæ feed upon different substances; *M. domestica* breeds in dung and stable refuse, while its relative, *M. vomitoria*, is, as all know, a meat-devourer. The blow-fly, however, has its insect enemies; and amongst them is, I think, a parasite of the Dipterous order, whose history I have read, but cannot at this moment refer to.—*J. R. S. C.*

THE CLIONE.—I have carefully investigated oyster-shells, stones, &c., and find similarly sized cavities in stones, and as clustered as in oyster-shells. There is invariably, on close examination, to be found a shell, in some stage of development, in the tunnel, as far as my observation goes. I go against the theory that the sponges bore for themselves. I have found this shell as small as a butterfly's egg in the tunnels both of limestone rock and oyster-shells.—*G. E. R.*

A SUGGESTION.—Having seen in SCIENCE-GOSSIP several complaints of the inaccuracy of Local Floras, Botanists' Guides, &c. &c., I think the following (if practicable) would be a remedy. To form a botanical club or society, with a recorder to keep the lists of localities sent, &c.; and, when complete, to have them published. I think that a great number of botanists in all parts of Great Britain would be willing to give aid to such a plan. I should like to hear the opinions of other correspondents on this subject, through the medium of this journal.—*J. B. Blow.*

HYMENOPHYLLUM TUNBRIDGENSE. — In the March number of SCIENCE-GOSSIP, Mr. R. M. Middleton says that he knows a locality for this fern not far from Llanberis. I find the following in Davies's "Welsh Botanology," page 99 (published 1813);—"*H. Tunbridgense*: Filmy-leaved Fern. At Trewilmot and Holyhead mountain; very scarce." It would be interesting to know whether it is to be found in those localities *now* or not.—*Rev. W. Davies.*

CLOTHES MOTHS.—I should feel greatly obliged by your informing me how to destroy thoroughly the tiny moths that eat woollen garments. I have suffered a wholesale destruction of coats, trousers, flannel shirts, &c., that has driven me, a very poor man, to the verge almost of madness. I have tried camphor, insect-powder, pepper, &c.; but all in vain. What can I do to save the remnant of my clothing that may be yet left to me, for I hardly dare to examine my clothes? Being short of boxes, I kept these garments mostly in bags that originally brought coffee or rice to England; but they have entered my two boxes even. I have caught and killed hundreds of these (*Tinea*, I think they are called) in only a week during last summer and autumn.—*W. M. M.*

ENDROMIS VERSICOLOR.—In the March issue of SCIENCE-GOSSIP, an article appears on "Web-weaving Caterpillars," and among those instanced, is that of *Endromis versicolor* (the Kentish Glory moth). I should like to ask the writer (C. Lovekin) whether he so terms this larva from personal observation, and if not, whence his authority? During a series of years I reared hundreds of the larvæ and distributed thousands of the eggs, yet never saw the least approach to web-weaving; indeed its habits are directly opposed to that theory. When hatched, the young larvæ are black; they proceed at once to station themselves on the twigs of the Birch, in a position so as closely to resemble the small black stumps so numerous on that food-plant. After their first moult they are green, and it is then almost impossible to distinguish them from the catkins of the Birch; when more advanced in growth, they resemble the developed leaves in colour and contour: thus protection by assimulation is afforded, and web-spinning is not only unnecessary but would be contrary to the usual economy of nature. A life history of this insect may be found in the *Entomologist* for April, 1865, page 184. — *George Gascoyne.*

HYBERNATION OF SWALLOWS.—From time to time there have appeared, in SCIENCE-GOSSIP, papers on the supposed hybernation of swallows, whether above or beneath the water. The following incident may perhaps throw light on the origin of some of the ideas current on this subject. In the early part of the year 1843 I was residing at Great Glenham, in Suffolk. One morning about the beginning of March, I was told that a swallow had been seen coming out of a pond near our house. I expressed my disbelief in the correctness of this information, but was assured that there could be no mistake. Some days afterwards our gardener came to me in triumph, and told me that he had brought me the swallow, which had been found dead near the pond where it had before been seen. On taking it in my hand, I saw at once, from its webbed feet, that it was a storm petrel (*Thalassidroma pelagica* or *T. Leachii*); but, being quite a boy at the time, I was not then aware that there was more than one species. I must confess that, at first sight, it looked very like a swallow, and I should not have been surprised had the mistake been made by far better observers. Doubtless the poor bird had been driven inland by a violent gale, with which we had been visited a few days previously, and had rested on the pond until disturbed by our informant. Had not the bird been found, the rising of the *swallow* from the pond would have seemed incapable of satisfactory explanation.—*E. N. Bloomfield.*

Do Animals ever Commit Suicide? In support of the theory of your correspondent "J. R. S. C.," viz., that animals do sometimes commit suicide whilst in a state of insanity, I may call attention to the following incident of indubitable veracity recorded in Jesse's "Anecdotes of Dogs:"— "A fine, handsome, and valuable black dog of the Newfoundland species, belonging to Mr. Floyd, solicitor, Holmfirth, committed suicide by drowning itself in the river which flows at the back of its owner's habitation. For some days previous the animal seemed less animated than usual, but on this particular occasion he was noticed to throw himself into the water and endeavoured to sink by preserving perfect stillness of the legs and feet. Being dragged out of the stream, the dog was tied up for a time, but had no sooner been released than he again hastened to the water and again tried to sink, and was again got out. This occurred many times, until at length the animal, with repeated efforts, appeared to get exhausted, and by dint of keeping his head determinedly under water for a few minutes, succeeded at last in obtaining his object, for when taken out this time he was indeed dead."—*H. A. Auld.*

The Sword-fish (p. 71).—My attention has been fully directed to the subject named by "E. H. R.," and I concur with him in the opinion that the reverend gentleman who wrote the article alluded to has fallen into a very grave misapprehension. The fish which he describes as the *Xiphias gladius*, I take to be a species of sea-pike: the small specimens found on our coast are known as Gar-fish (*gar*, A.-S., "spear, pike, or javelin"). It was formerly classed with the Jack, as *Esox belone;* Cuvier named it *Belone vulgaris*, but it is now described as *Lepidosteus lucius; Lepidosteus*, from its hard scales; *lucius* (pike) being a misnomer, derived from the *Fleur-de-lis*, or White Lily of France. Two species may be seen at the British Museum and the College of Surgeons; viz., *L. lucius*, the Gar-fish, and *L. osseus*, the Bony Pike; the latter is, probably, the fish figured in the *Leisure Hour* for January, the woodcut in question being altogether unsuited for the true Sword-fish (*X. gladius*), or for the Saw-fish (*Pristis antiquorum*).—*A. Hall.*

Flea-bites!—The extraordinary amount of irritation and swelling which these occasion in some instances can hardly be accounted for on the supposition that this bite is a simple incision. In Science-Gossip of last year, an interesting account was given of the tongue and lancets of the flea; but I cannot help thinking there is something which the microscopic investigator has missed as yet; viz., some gland or other apparatus which yields a poisonous fluid, that is thrown into the puncture. If there is anything of the kind, it must be exceedingly potent, since the supply of it cannot be large, and a flea will leap hither and thither upon the human skin, biting a dozen times in quick succession, each bite being followed by the usual result. From a friend whose experiences in this direction are particularly painful, I glean the fact that the bite of what is (presumably) the male flea, or at least the smaller individual, is most to be dreaded.—*J. R. S. C.*

Mice and Birds.—In reply to your correspondent "Tedesca's" question, I beg to state that one night, a few weeks since, I observed one of my birds, a linnet, which was ill, roosting near the lower part of my aviary. The following morning it was found dead, and partially devoured by the mice. During the summer of 1870 I missed one of my hen canaries from the food-troughs, and, on examining the nest-box where she had been sitting, I found nothing but a mass of feathers, with scarcely a vestige of the poor bird amongst them: the mice had eaten all, even the bones, beak, and claws! Whether these birds were living or dead when the mice attacked them, remains of course an open question, but I have every reason to think that they have destroyed numbers of unfledged canaries in the nests. Can any one suggest a plan to prevent their entrance into aviaries and large cages?—*E. M. P.*

Fungi.—I shall esteem it a great favour if any of your correspondents who have had experience in preserving fungi will kindly inform me of the best mode of preparing them for the cabinet.—*H. A. Auld.*

New Fungi.—Allow me to correct an error which appeared in the last number of Science-Gossip, p. 90, in reference to *Perichæna quercina*, F., found by Mr. T. Brittain. It was not I who identified the plant, but C. E. Broome, Esq., to whom I sent it, being myself unable to identify it. This may appear a trivial matter; but when a gentleman takes the trouble to identify a plant, it is but just that he should have the credit for so doing.—*William Phillips.*

Wood-Pigeons.—The turnip tops found in the crops of the Wood-pigeons are precisely what might have been expected, the green leaves and shoots of the turnip forming their favourite winter food. These are varied with clover-leaves in the spring; later on, seeds of the dock, chickweed, charlock, and other "pests of the farm." About harvest time, the above, with the addition of wheat and barley; after harvest, acorns and beech-mast, of which they are very fond. There is no doubt Wood-pigeons will feed on corn when they can get it; but their opportunities for harm are limited, for good unlimited; and the immense quantities of noxious weeds destroyed by them, at all seasons of the year, far outweigh the harm done, at certain seasons, in places where they unduly abound.—*Thos. Southwell.*

Vitrina pellucida.—It is very probable that those who assert that the Vitrina is incapable of wholly withdrawing into its shell, and those who assert to the contrary, are both right. My own observations lead me to believe, that when the Vitrina is found in a moist condition, no amount of irritation or force employed can make it withdraw itself entirely within its shell; but if put in a dry place, and left without moisture, it is then capable of shrinking entirely within the shell, so as to enable it to fit the mouth of the shell to any flat surface it may be attached to. Having kept a couple of *Geomalacus maculosus* for a few months under a bell-glass, and having introduced a few *Vitrina pellucida* under the same cover, I was surprised to find the Vitrina shells empty in a few days: this led me to believe that the Vitrina had become a prey to the Geomalacus. Since then I have introduced more Vitrinæ, and a few of the following species:—*Zonites glaber*, *Z. nitidulus*, *Z. purus*, *Z. crystallinus*, two *Helix fusca*, two *H. caperata*, two *H. hirsuta*, and three *Clausilia laminata*, with the following results: all the shells representing the genus Helix are empty, with the shells more or less scraped away and perforated; all the Vitrina shells are empty, but left perfect; and some few of the *Z. purus* and *Z. crystallinus* are tenantless. The Clausilia and the other two species of Zonites remain untouched. Whether all these may have fallen victims to the rapacity of *Geomalacus maculosus*, may be questionable, but I would suggest that the probable cause of your last month's correspondent from Banbury finding so many of the Vitrina shells empty, might be owing to the ravages of the black slug, *Arion ater*, and its congener the *Arion hortensis*. Experiments carefully observed would no doubt determine this point. Allow me to say further, that in my experiment with the Geomalacus I added occasionally a piece of carrot, which seemed to suit the taste of this rare Irish slug; also a dead shell of *Succinea putris* has been nearly eaten away.—*Thos. Rogers.*

Does the Moon affect Lunatics?—Could you inform me in what way the moon affects lunatics? Having heard that it did, and being unable to find it in any book, I should be glad if you could inform me through Science-Gossip.—*R. P. U.*

Sparus.—On the 15th ult. a fisherman of Helford harbour brought to me a *Sparus boöps*, which he had just caught in a herring-net. It was twelve inches in length and two inches in depth. The silvery gleam of the body and of its yellow stripes was most brilliant; there were patches as of burnished gold in front of the eyes. The first British recorded specimen was caught near the entrance of Falmouth harbour in 1842, and was brought to my brother, Alfred Fox, who had a coloured drawing of it taken, of which Jonathan Couch published a copy in his valuable book on British fishes. It is a more faithful representation of this beautiful fish than that given by Bloch. Dr. Cocks, of Falmouth, sent a Boöps, caught at a later period (in the same fishing-ground), to the British Museum. I have often seen this fish in the market of Algiers. The Sword-fish is justly esteemed there; its flesh is, I think, preferable to that of other Scomberidæ; such as the Thunny or Mackerel. It probably swallows the blood and other juices of the fish that it wounds, as it is almost toothless. Its ear-bones must be very minute or rudimentary, as I could not discover any.—*C. Fox.*

The Sword-fish.—The author of the article "Notes from the South Pacific," in the *Leisure Hour* for January, has not, in my opinion, "fallen into error in describing the *Saw-fish* as the *Sword-fish;*" at the same time, I have not seen a sword-fish with the *saw-like* teeth which are figured in the cuts illustrating his paper. The Saw-fish (*Pristis antiquorum*), length in some instances, 12 to 15 feet (a specimen of which is in my possession), is of the Shark family, and has its head prolonged by a long flat plate, bearing osseous spines implanted like teeth on each margin, and resembling a saw. The specimen before me measures 34 inches in length, and has 26 teeth on each side, each tooth being 1¼ inch long. It was found in a river in Demerara. Your correspondent "E. H. R." is certainly right in saying it would be impossible for the Saw-fish to penetrate the timbers of vessels with his "saw," although it is a powerful weapon to attack whales and other cetaceous animals; whereas the Sword-fish is a well-known enemy to ships, one of these "swords" being found, some years ago, sticking to the depth of eighteen inches in the lower timbers of Her Majesty's ship *Fawn.* The writer in the *Leisure Hour* says the fish he describes has been pronounced "delicious" food by all who have tasted it; moreover the flesh of the *Saw-fish* is hard and ill-tasted. Upon the whole, it is clear that the fish described in the *Leisure Hour*, whatever species of sword-fish it may be, is not the *Sawfish.*—*H. Allingham.*

Fossils.—A correspondent in last month's Science-Gossip asks for information relative to corn-brash and forest marble fossils in the West of England. In answer thereto, I beg to state that in a little work published by Stanford, of Charing Cross, entitled "Geology of Weymouth and the Isle of Portland," there is a good deal of interesting matter relating to the above, with list of fossils &c.—*T. W.*

Brimstone Butterfly.—There is a variety of this species with orange-coloured patches in the fore wings, which occurs in France. Possibly it is a specimen of this variety to which Mr. H. Moore refers in his note in last month's Science-Gossip. A hybrid between two such widely separated species as *Gonepteryx Rhamni* and *Colias Edusa* would be most unlikely to occur.—*Harry Leslie.*

A White Brimstone (p. 95).—I scarcely believe Mr. Moore is justified in imagining that the butterfly referred to is a hybrid between *G. Rhamni* and *C. Edusa*, since this variety of the Brimstone and the typical form have both been reared from the same batch of eggs. This variety is occasionally met with. In the south of Europe a variety is met with called *G. Cleopatra*, in which the orange patches cover nearly the whole of the upper wings.—*W. H. Warner, Kingston, Abingdon.*

Passion-flower.—I have been told that the passion-flower was used in the early Christian churches as a symbolic reveration of faith, because of the resemblance discovered by some of the Catholic fathers in different portions of the flower to our Saviour's passion. Thus: the five anthers are the wounds; the stigmas represent the nails; the rays of the corona, the crown of thorns; and the ten parts of the perianth are apostles; Peter and Juda being absent—the one who betrayed, the other who denied our Lord.—*H. E. Watney.*

Starlings.—These birds, like swallows, are migratory birds. In the northern parts of this country, where the winters are severe, the Starling, on the approach of the cold season, wings its flight southward, returning to its old haunts about February or (if the season be inclement) March. In the south of England, during mild winters, they will often remain. At Charminster, a pretty little Dorset village, we had frequently the Starling all the year round, unless a very severe season set in, and then we missed them for a short time. The country people in Dorset are very fond of starling dumplings; and they are often sold for a shilling a dozen by the labourers. The chief winter food of starlings consists of berries of all descriptions; such as mountain ash, haws, and grain. A gentleman of my acquaintance used to make quite a friendship with a colony of starlings which dwelt on the eaves of a neighbouring house. During the summer time, when the cherries were ripe, he used to lay some on his window-sill, and, being an invalid, it used to pass many a weary hour pleasantly away, watching his pet starlings. During the two years of his confinement, those birds became quite tame and sociable, really looking out for their dessert and their handful of corn, which was daily placed for them. One day a friend sent him some starlings for a dumpling, when he remarked he would as soon think of turning cannibal as eating any of those poor starlings, for they had beguiled many a sad and painful hour, and their voices were heard first in the morning, and their cheerful chatter was his lullaby at eve. I do not fancy I could relish them myself, although I believe they are very savoury.—*Barbara Wallace Fyfe.*

The Starling.—In reply to "H. O. S.," the Starling is resident in England throughout the year, and is probably also a partial migrant. In mild winters, the old birds sometimes continue to frequent the trees or buildings where they nest. Their food consists almost entirely of earthworms, snails, insects and their larvæ, with an occasional seed or berry; but these form the exception. In autumn they congregate in immense flocks, which repair night after night to the same roosting-place. These flocks begin to assemble as soon as the first broods leave their nests, and go on increasing with successive broods till they are, later in the season, joined by old birds also. Early in the morning they disperse to their feeding-grounds, again to return with the setting sun to their chosen resting-place.—*T. Southwell.*

Collection Catalogues.—I observe, among the advertisements in Science-Gossip, an announcement of the publication of a printed form of catalogue, prepared by Mr. Harting. It is no doubt a useful plan, but it does not fully explain itself. Will some one who has experience in cataloguing explain how he would set about to make a catalogue of a collection of say 2,000 botanical specimens, supposing that the specimens have already the necessary particulars attached to each, but not collected in a book, and that the collection is still rapidly increasing in all departments, phanerogamic and cryptogamic? It is easy enough to write out a catalogue of a completed collection, either alphabetically or in the order of classification; the difficulty lies in dealing with the *additions*, so as to avoid future confusion. Is there any better plan than the day-book and ledger; that is, to enter every addition consecutively in one book, with a consecutive number to each, and afterwards post them into a fully classified catalogue? This plan is cumbersome and slow.—*F. T. Mott.*

Does Gas-light kill Plants?—I should be glad if some of your able correspondents would inform me whether gas, or the gas-light, kills plants? It is commonly supposed it does, but I should think wrongly, as the gas given off must form nourishment rather than otherwise.—*E. T.*

Mites.—A neighbour last summer requested the writer to inspect his daughter's house, as it was, especially the drawing-room, which had been lately newly furnished, infested with a very minute species of mite. So extreme was the nuisance, that the maker of the furniture had been sent for from a town a long way off to examine it, and even an action seemed not unlikely. Though the little pest was scarcely visible to the naked eye, the edges of the moreen curtains, the chair-bottoms, the insides of the piano and chiffonier, as well as other parts of the house and furniture, were quite white with them. I recommended the best means I could think of to destroy them,—ventilation, brushing, fumigation with sulphur, the use of carbolic acid, &c. The only other way, besides through the medium of the furniture, in which they were suspected to have been imported, was in a box of figs. The acarus was extremely hairy, pointed in front, and gibbous behind; but I send mounted specimens, which may be given to anybody who takes an interest in the mites.—*R. G.*

Lesser Pettychap, or Chiff-chaff (*Sylvia hippolais*).—The early appearance of this lively little warbler is recorded on p. 93, by Mr. Westropp, who noticed it on March 9th. Six days later it was chirping in a shrubbery close to this house. Now, are there not good grounds for believing that this little bird does not migrate, since it has shown itself able to bear the severe frosts and heavy snows which prevailed since its arrival? It stays later than the other small emigrants, for I heard it in the woods last year so late as the second week in October. I am no believer in the hybernation of birds, but I have long had an idea that this species does not leave this country at all, but retires in winter to sheltered spots in woods, where it picks up a subsistence from the trunks and branches of trees, like the tits and other small birds. The disuse of its song, and its small size, would render it very unlikely to be noticed by ordinary observers. While on the early appearance of birds of passage, I may state that the Blackcap (*Curruca atricapilla*) has been in full song here since the 30th of March, and that I noticed three sand-martins (*Hirundo riparia*) about their old haunts the following day.—*W. H. Warner.*

Paste Eels.—With some others I have often been troubled to procure these creatures, though carefully following the directions of the books. At others, I have found them abundantly in paste which has been put away and not touched. I have often seen it stated that some peculiar ears of corn, when soaked a short time, will abound with eels in the grains; and if so, may not the difficulty some persons find in getting them, proceed from the flour not having any of these particular corns ground up with it? As to their "spontaneous generation," I believe they are generated one from another, as is evident in the eggs and young ones.—*E. T. S.*

Paste Eels.—I have tried "F. K.'s" plan for obtaining *A. glutinis* several times, and I have not succeeded once. The following is a better (at any rate cleaner) way of preserving them when they appear than "F. K.'s." I copy it from Dr. Jabez Hogg's work on the microscope. He says: "The best means of securing a supply for any occasion, consists in allowing any portion of a mass of paste in which they show themselves, to dry up, and then lay it by for stock; if at any time a portion of this is introduced into a little fresh-made paste, and the whole kept warm and moist for a few days, it will be found to swarm with these curious little worms."—*W. Sargant, Junior.*

Paste Eels.—My little random shot has induced "F. K." to shelter himself behind Mr. Pritchard, and thus brought me face to face with a giant; but the little wrigglers in question, having been my occasiona.

pets for more than forty years, I may, perhaps, be allowed to indulge a little obstinacy in holding my opinion still. I am compelled to notice this subject again, because "F. K." has become catechist. I leave my unknown questioner to guess for himself, assuring him, at the same time, that my little scraps of scientific knowledge induce me to attribute "Apostolic succession" alike to cats, rats, mice, and—Paste Eels; and to the belief that there is a much greater difference between "Paste Eels" and "Wheat Eels" than there is between a sheep and a goat.—*A. Nicholson.*

The Ermine in North Wales (p. 71).—Your correspondent "W. P." is, it seems, unaware that the Ermine is in reality the Stoat in its winter dress. This animal, like the Scotch or varying hare (*Lepus-variabilis*), turns white in winter. The change from brown to white is more apparent in Northern Europe, but I have myself seen a specimen of the *Mustela erminea* hanging up in a wood here which was quite white, except a tinge of brown along the back. The *M. erminea*, whether in its summer or winter dress, whether as a stoat or an ermine, may easily be distinguished by the tip of the tail being always black.—*W. H. Warner.*

The Ermine.—I believe the cause of the confusion is that the majority of stoats do not, in this comparatively mild climate, fully change their coat in winter. They are seldom *pure* white.—*G. E. R.*

The Ermine in North Wales (p. 71).—It would seem probable that the discrepancy in question may be due to the comparative mildness of our climate, and the exceptional mildness of the past winter. It appears quite certain that the change observed in the fur of our stoat, the *Mustela erminea*, is a result of the effect of severe cold. As a boy I was familiar with the Stoat in farms at the south of England, but I never met with it in what is called its winter coat. The finest ermine comes from northern latitudes. If all our stoats were found to produce the fur called ermine in perfection, no doubt we should cultivate the trade for our home market.—*A. H.*

Rats at St. Helena.—A gentleman who has passed many years of his life at St. Helena, told me lately several stories about rats, so curious that I thought them worthy of record. He said that at one time the common brown rat was extremely common all over the island, in fact, a perfect pest; and to avoid its attacks his father had constructed a large store, rat-proof; *i.e.*, a rat once in could not get out again. A number, however, came in with produce and goods from the ships, and bred there. Around this store were venetian blinds to the windows, and one day one of his men, when it was raining, watched a rat sitting on the venetian, and putting out his tail to collect on it the drippings of water at the edge: he then withdrew it and licked it. The servant told his master, who immediately understood that the rats could get no water inside the store, and therefore directed that a butter firkin should be cut down to four or five inches, and in the top a large circular wire rat-cage trap should be fixed. Several small planks were placed for the rats to get up to the entrance to the cage, which exactly fitted the firkin. No food would have induced the rats to enter the trap, but water did, and many were thus captured. When caught they were given to the dogs; but there was one rat which would not leave the trap for many days. He was well identified day by day, till, becoming incautious, he leapt down, and was immediately killed. There is one peculiarity with these rats, viz., their very often building or making their nests in the trees. I have in India several times found rats' nests in trees; but then they have always been stolen nests, such as deserted abodes of the squirrel or sparrow; but here my friend, who is no naturalist, tells me that they construct them principally of fir spines, on the ends of the boughs, some twelve or fifteen feet from the ground, in the common fir-trees. The spots selected are just where the overlapping bough nearly meets the lower one. He said that all know the rats' nests, and that he had seen them fired at, when many rats were killed, and fell out to the ground. He could tell me no more, and I think that, if original nests, as he held them to be, some grass must be woven in during their construction, as fir spines have but little power of cohesion. The situation of these nests was worthy of notice, although there is scarcely a situation where a rat's nest has not been found.—*C. Horne, F.Z.S.*

Gryllus viridissmus.—I am sorry I cannot at present render much assistance to "E. A. M." (p. 59). I have occasionally kept these large green grasshoppers for a few days: they never voluntarily attempted to eat anything; but when a fly, stuck on the point of a needle, was held near the mouth, they would readily take and eat it. If possible, next summer I intend to study this insect more minutely: the larva is very pretty, and a brighter green colour than is the perfect insect.—*C. G. R.*

Liparis dispar.—At p. 69 Mr. Laddiman expresses a desire for information respecting this insect. I have reared several broods ("in-and-in"); in 1870 my moths were very fine, most of them, both males and females, were as large as those figured by Mr. Newman. I have this day carefully measured a female in my collection, and find it to be, from tip to tip of the expanded wings, two inches and three-quarters, which is exactly equal to the figure in "British Moths." Measuring a male in the same manner, I find he exceeds Mr. Newman's by one-twentieth of an inch. Last summer my *L. dispar* were not so fine, but I believe this was owing to the unfavourable season, as several other species were comparatively small. I have not met with much variety in *L. dispar;* the principal variation consists in the general ground-colours, most observable in the female, some being of a creamy, while others are of an ashy-white tint, with the blackish wavy lines more or less developed. Although my moths were not so large, they were well marked last year, and the males displayed more variety than usual, the upper wings of some approaching to a sandy-brown colour, and others were quite dark or cinerous. I have a few eggs of *L. dispar* to part with. If Mr. Laddiman or Mr. Henderson would like to have some of this strain, I shall be most happy to oblige them. The Editor has my address, and will kindly furnish it if required.—*C. G. R.*

How to Stock a Pond.—Will one or other of your experienced readers give me some hints for stocking with fish a newly-made lake of water consisting of about two acres? The depth averages 2 feet 9 inches, with several holes of deeper water. The bottom is gravelly. There is a constantly running spring, but not very rapid. What fish should I put in with a view to angling? Would it be any use to try *trout?* Where should I obtain a supply of fish for the purpose?—*F. C.*

NOTICES TO CORRESPONDENTS.

E. W.—The larva is that of *Meloë angusticollis*. For a full account of this and other parasites on the bee, see article in SCIENCE-GOSSIP for 1870, pages 2 and 3, entitled "The Parasites of the Honey Bee," by Dr. A. S. Packard.

ENQUIRER.—We have received the piece of gummed paper said to contain specimens of mites. We do not undertake to name specimens unless sent in a fit state for examination. We cannot ask those gentlemen (all of whom are authorities in their special departments) who kindly undertake to assist us, to prepare specimens for examination. It is also necessary that the sender should furnish us with all the information as to habitat, &c., he is able to give. We are always anxious to assist the student in natural history, but he must also put his own shoulder to the wheel.

L. T.—The moss is the commonest that grows, the Screw Wall-moss (*Tortula muralis*).

NEW SUBSCRIBER.—Answer next month.

IGNORAMUS.—The small larvæ-cases found on espalier apple-tree are those of *Coleophas anatipennella*.

A. L., Scarborough.—You will find Stark's "British Mosses" (Lovell Reeve & Co.), price 7s. 6d., a capital introductory book to the study of mosses, containing a good number of coloured illustrations.

R. DE L.—The jelly-like substance adhering to leaves is probably the ova of some species of shell-fish, perhaps of *Limnea*. It is not the *common* stickleback, which builds a nest.

RICHARD SMITH, Belper.—Tissues may be placed in the carmine staining fluid as soon as cut, unless maceration in glycerine is requisite to soften them. You will find all the information required for staining the various tissues in Dr. Beales's "How to work with the Microscope."

UNSCIENTIFIC ASTRONOMER.—There is a society called the "Observing Astronomical Society," different from the Royal Astronomical Society. The Hon. Secretary's name is William F. Denning, from whom all information may be obtained. —Address Messrs. Wyman, 74, Great Queen Street, London.

A. H. A., Liverpool.—The Poduræ in the piece of wall-paper are *Achorutes purpurescens*, common in damp places.—F. J. McI.

B. E. F.—Mineralogy is now included as part of chemistry, rather than of geology, as was formerly the case. There can be no doubt that the connection between the two former is far more natural, although mineralogy is of great service to the geologist, especially in his lithological investigations.

ROY.—You will find a full account of the natural history position, functions, and habits of the sponges in Nicholson's "Advanced Text-book of Zoology," or in the "Manual of Zoology," vol. i., by the same author.

A. SMITH.—The parcel of grass sent is the Sweet-scented Vernal Grass (*Anthoxanthum odoratum*). It is the presence of this grass which gives the well-known scent to newly-mown hay.

A. J. D.—A capital chapter on "Mimicry" will be found in Wallace's "Contributions to the Theory of Natural Selection." Bates first broached the doctrine in his "Naturalist on the Amazon." See article in last number of the *Entomological Magazine* on mimicry in insects.

J. B.—*Hypnum commutatum*: a little Anodus will be acceptable.—*R. B.*

EXCHANGES.

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

FOR Pollen of Convolvulus send stamped directed envelope to John H. Martin, 86, Week Street, Maidstone.

FOREIGN Coleoptera offered for British ditto or Lepidoptera. —W. H. Groser, 15, Thornhill Road, Barnsbury, N.

TWELVE varieties of cotton wool (named). Send stamped envelope and any microscopical material to Levi Tetlow, Lees, near Manchester.

FOR *Hæmatopinus suis* (Pig Louse) and *Polyxenus Lagurus* (Pencil-tail), unmounted, send well-mounted object of interest to C. F. George, Kirton Lindsey, Lincolnshire.

BARHAMIA CAPSULIFER, the new British leaf-fungus, for other objects of interest.—Address, with list, Thos. Brittain, 52, Park Street, Green Heys, Manchester.

SEPIOSTAIRE (*Cuttle-bone*) and *Puccinia umbilici* offered for stamped envelope and any object of interest.—H. Munro, Lyme Regis, Dorset.

WANTED, Coal-measure Fossils for Mountain Limestone and Limestone Shale Fossils.—Send list to S. Bormingham, Arkendale, Richmond, Yorks.

A FOSSIL Tooth in coal (mounted), for any human parasite also mounted.—J. M. Hoare, The Hill, Hampstead, London.

UREDO POTENTILLARUM; for specimens of this fungus send stamped envelope to J. R. Focklington, The Oval, Redland, Bristol. Any object of interest acceptable.

WANTED to exchange, rooted named specimens of the rarer Sedums and Saxifrages; also wanted to purchase, Nos. from 23 to the conclusion of Sowerby's "Grasses."—Address J., 3, Bromley Terrace, Cirencester.

WANTED Silkworms or eggs, for British ferns.—J. Stalker, Brathay, Ambleside.

TOUS LES MOIS, the largest known starch, offered for any object or material.—Address W. F. Henley, Wilts Dorset Bank, Warminster.

WANTED, three or four specimens of the Large Stag Beetle (*Lucanus Cervus*), for dissection, for microscopic slides. —Address J. S. Harrison, 86, Portland Street, Hull.

CYCLOSTOMA ELEGANS and *Helix pomalia* for other British shells.—B. F. Buxton, Easneye, Ware.

WINGS and sections of British and Foreign Lepidoptera, named, for other good microscopic material.—Chas. J. Watkins, Painswick, Gloucestershire.

FOR Hair of Buffalo (unmounted) send stamped envelope and object of microscopical interest to E. Lovett, Holly Mount, Croydon.

COLLECTION of Norwich Crag Fossils in exchange for books on Geology.—G. S. Tooke, King Street, Norwich.

FOR *Puccinia Anemonæ* (Anemone Brand) send stamped envelope; no exchange required.—Thos. Brittain, 52, Park Street, Green Heys, Manchester.

FOR Parasite of Humble Bee, send stamped envelope and any microscopic object to J. Sargent, Jun., Fritchley, near Derby.

SECTIONS of *Uterine Tumour* stained with carmine and mounted in glycerine, in exchange for other equally good objects.—R. Smith, Jun., Stone House, Belper.

EGGS of Kestrel, Dipper, Water-rail, &c., for eggs of Sparrowhawk, Nightjar, Green Woodpecker, &c.—Arthur Smyth, Parracombe, N. Devon.

TRACHEA of Centipede or Ox Parasites, in exchange for well-mounted Polycistina.—H. B. Thomas, 13, Market-place, Boston, Lincolnshire.

FOR Cuticle of *Cotylédon Umbilicus* prepared for the polariscope (unmounted), send stamped envelope and any object of microscopical interest.—W. H. Gomm, Somerton, Taunton.

BOOKS RECEIVED.

"The American Naturalist." March.

"The Canadian Entomologist." Nos. 2 and 3.

"Annals and Magazine of Natural History." April.

"Quarterly Journal of Microscopical Science." April.

"The Journal of Botany." April.

"The Entomologist's Monthly Magazine." April.

"The Zoologist." April.

"Notes on Chalcidiæ." Part VI. By Francis Walker, F.L.S. London: E. W. Janson & Co.

"Les Mondes." March.

"Land and Water." Nos. 322, 323.

Timb's "Year-book of Facts for 1872." London: Lockwood & Co.

"Journal of Applied Science."

"Popular Science Review." April.

"Illustrirte Natur-Wissenschaft." No. 13.

"Proceedings of the Bristol Naturalist's Society, 1871, May to December.

COMMUNICATIONS RECEIVED up to 15th April.—R F. W.—W. J.—J. R. P.—C. H.—G. G.—J. S. H.—W. F. H.—J. H. K. —J. S.—B. L.—W. W. S.—A. S.—T. C. M.—C. R.—R. G.—J. M. W.—W. K. F.—S. J. McI.—J. B.—E. T.—B. W. F.—R. S. —A. H. A.—C. F.—J. B.—W. G.—J. H. G.—J. S. W. D.—R. H. M.—E. T. S.—A. N.—E. N. B.—W. H. W.—H. E. W.—A. H.—E. M. P.—T. G. B—W. B.—T. B.—T. S.—F. K.—J. F. —J. H. M.—W. D. R.—J. M. H.—J. M. C.—T. B. B.—S. B.—R. De L.—J. C. M.—C. R.—M. C. L.—A. L.—A. J. D.—W. P. —F. T. M.—G. E. R.—J. F.—W. B.—W. H. G.—H. E.—C. L. —G. B. C.—G. H.—W. S.—C. F. G.—H. L.—M. E. B.—G. R. R.—T. W.—J. R. J.—F. A. P.—E. L.—C. W.—C. J. W. —H. D.—B. G.—B. F. B.—J. S., Jun.—F.—F. J. W.—J. L. C. —W. H. G—G. S. T.—G. H. H.—F. M. M.—H. B. T.—A. L. —A. S.—T. W.—R. S.—J. S. D.—C. J. W. R.

COLLECTING AND PRESERVING.

No. V.—BUTTERFLIES AND MOTHS.

By Dr. Knaggs.

THE collector of Lepidoptera who aspires to success must read the book of nature as he runs. If he have not the wit to note and turn to account each little fact which may come under his observation, neither he nor science will be the better for his collecting. He should, whenever he makes a capture, *know the reason why*, or he will never make a successful hunter. He should be ever on the alert, his motto, *nunquam dormio*.

Some collect for profit, others for pastime; but the aim of our readers, I take it, is not only to acquire a collection of really good specimens, but also at the same time to improve their minds; and the best way of effecting this purpose is to hunt the perfect insect, not so much for itself as for the sake of the golden eggs, which, with proper care and attention, will in due course yield the most satisfactory results in the shape of bred specimens.

This being the case, and space being limited, it seems best to simply touch upon the preliminary stages of insect existence, pointing out as we go those methods of collecting and preserving which experience has shown to be the most successful.

There can be no doubt but that egg-hunting is a very profitable occupation, and far more remunerative than most people dream of, particularly as a means of acquiring the Sphinges, Bombyces, and Pseudo-bombyces. Eggs, speaking generally, are to be found on the plants to which the various species are attached; and a knowledge of the time during which the species remains in the egg state, as well as the appearance of the eggs as deposited in nature, should if possible be acquired previous to proceeding to hunt. The most practical way of ascertaining the food and time is to watch the parent insect in the act of depositing her ova; but when the plant has been thus discovered, the best way is to capture her, and induce her to lay at our home. When eggs are inconspicuous, of small dimensions, or artfully concealed, the use of a magnifying-glass is invaluable.

Eggs may be preserved by plunging them in boiling water or piercing them with a very fine needle, or they may have their contents squeezed out and be refilled by means of a fine blowpipe, with some coagulable tinted fluid; but the shells themselves, after the escape of the larvæ, form, when mounted, beautiful objects for the microscope.

The three most successful plans of obtaining caterpillars are searching, beating, and sweeping. The first requires good eyesight and a certain amount of preparatory knowledge; the others are a sort of happy-go-lucky way of collecting, useful enough and profitable in their way, but affording a very limited scope for the exercise of the wits. In searching for larvæ, the chief thing is to observe the indications of their presence. A mutilated leaf, a roughened bark, a tumid twig, a sickly plant, an unexpanded bud, an abortive flower, or a windfall fruit, should at once set us thinking as to the cause; or, again, the webs, the silken threads, the burrowings and trails, or the cast-off skins of larvæ, may first call our attention to their proximity. Of course, larvæ may be found on almost all plants, as well as in the bark, stems, or wood of many; but the collector should fortify himself with a knowledge of what each plant is likely to produce, and hunt accordingly; for though indiscriminate collecting may sometimes be successful, it does not tend to improve the intellectual powers.

Beating is the more applicable method of working trees and bushes. It is carried out by jarring the larvæ from their positions by the aid of a stick or pole, in such a manner that they will fall into an inverted umbrella or net; or a sheet may be spread beneath for their reception. Sweeping with a strong net, passed from side to side with a mower-like movement, is better adapted for working low ground-herbage. The umbrella net, shown in fig. 75, is, perhaps, the best for this purpose. It is

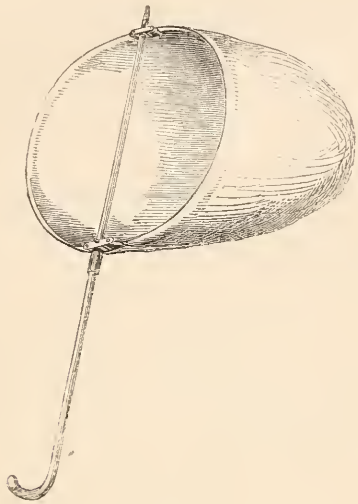

Fig. 75. Umbrella Net.

constructed by hinging two lengths of jack-spring on to two pieces of brass, and adapting them to the stick of the net, the upper piece of brass being fixed, the lower movable.

When captured, larvæ should be transferred to chip boxes, or else to finely and freely perforated tins, the latter better preserving the food. A very handy box for the purpose is formed by fitting a second lid on to the bottom of a chip box, and then cutting from the second lid and bottom a hole, as shown in fig. 76 (2); larvæ may then be inserted through the hole; but when the lid is shifted round, and the holes are not opposite, of course there will be no opening, as in fig. 76 (1), and the contents are secured from escape.

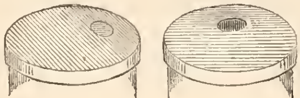

Fig. 76. Box for Larvæ.

Larva-preserving is carried out by first killing, and then squeezing and extracting the contents through the anal orifice by means of a crochet hook. When this has been done, the skin is inflated, but not to such an extent as to distend the segments, and is kept thus inflated while it is being dried in a heated metal chamber. Afterwards, if the colours are observed to have faded, they may be cautiously restored by the application of paint. These objects, mounted on suitable artificial leaves, are then ready for the cabinet.

Chrysalis-collecting is conducted according to the situation of the object sought. Some are to be found in the chinks of bark or under loose bark, which may be detached by means of a powerful lever. Some are suspended from trees, bushes, copings, hanging head downwards, or girded by silken threads to low plants or walls; others are to be found in the stems or trunks of their food-plants; many are concealed in cocoons of more or less perfect construction, others again amongst fallen leaves, but the majority are to be met with under the surface of the ground; in which case we shall have to dig for them by the aid of a trowel or broad chisel. The best situations for subterranean pupæ are open park-like fields, borders of streams, open spaces in fir woods, and they are usually situated within a foot or so of the tree trunks, at the depth of two or three inches, though sometimes considerably deeper. Of course both larvæ and pupæ of aquatic species will have to be sought for in their element, among the plants they frequent.

Chrysalis-preserving is a simple matter: the pupæ may be killed by plunging them into hot water or by baking; frequently, however, we find that the natural polish disappears with death, and this may be restored by varnishing. It is advisable that the cocoons also, where practicable, should be preserved, to give a notion of their appearance in nature.

Moths and butterflies may be sought for at rest or on the wing. They may be disturbed from their hiding-places or they may be attracted by various alluring baits.

At rest on stems of grasses and other plants, butterflies may be taken on dull, sunless days; but it requires some experience to detect a butterfly with its wings raised up over its back: the little "Blues" may thus be freely boxed in their localities. Again, such butterflies as hybernate may be found in old sheds and outhouses, or under stacks.

Moths may be taken at rest on tree trunks, palings, and walls, or amongst foliage and ground herbage. Some species are to be freely captured in this way after their evening flight is over. Of course, for evening work, a lantern to assist our vision will be indispensable.

On the wing, some butterflies are exceedingly active, others comparatively sluggish; some fly high, others low. In hunting them, the chief points to be remembered are not to alarm, but rather cautiously to stalk our game, and strike, when we have an opportunity, with precision. It is important also to avoid throwing a shadow over them, and it is a good plan to get to windward of them—anything like flurry will be fatal to success.

Moths which fly by day may be chased in the same manner, but some may be observed disporting themselves round trees; these must be watched, and netted as they now and then descend. Others fly at a very low altitude, and are only brought into the field of vision by our assumption of the recumbent position. At night again, though we watch for anything stirring in the air, among the trees or the herbage, our tactics are somewhat modified; for if the insect be of whitish colour, we should so place ourselves that its form will stand boldly out against a mass of dark foliage, whereas, if it be dingy in hue, we must take the sky for our background.

Disturbing insects, and thus causing them to start forth, and so render themselves visible, is another method of collecting. This is carried out in various ways.

First, the occupants of high trees may be expelled by jarring the trunk with a heavily-loaded mallet, or by thwacking the trunk with a long hazel stick; but a sharp look-out must be kept, for some sham death, and fall plump down, while others make off as fast as they can. Other plans are to pelt the trees with stones, or pump on them with a powerful garden-engine, or beat them with a long pole; and of all trees the most profitable for this purpose is the yew; though firs, oaks, beeches, and other trees are not to be despised.

For beating bushes there is nothing better than a walking-stick, and for low herbage a long switch passed quickly from side to side with a tapping movement is best adapted. The tenants of tree trunks may be disturbed by brushing the surface with a leafy little bough, or, better still, by the use of a strong fan, with which a powerful blast may be driven, the net being held in such a position as to intercept such insects as are blown off.

Thatch-beating in the autumn is a very profitable employment, particularly in the matter of *Depressariæ*. Sweeping need only be mentioned here, for moths collected by the process are anything but perfect insects.

There are various methods of attracting moths and butterflies. The first is effected by confining a virgin female in a muslin cage, the frame of which may be very readily formed by bending three pieces of cane into circles, and fixing these together at right angles, as shown in fig. 77. When this baited cage is placed in a favourable position, and the weather is propitious for the flight of the males, the latter will, in some cases, congregate, and may be freely captured.

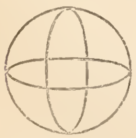

Fig. 77. Frame of Cage for Virgin Lepidoptera.

Then, the food-plant of the species is an attraction at which we stand the best chance of procuring impregnated females.

Various kinds of blooms possess alluring qualities for insects: of these, sallow and ivy are the greatest favourites with collectors. They should be worked after dusk by means of a lantern and net; but the combination of a lantern fixed to a long stick, with a shallow net beneath and a little in advance of it, as shown in the cut, is the apparatus best adapted for the purpose; the object of the net being to intercept any insects which may happen to fall under the stimulus of light. These attractions should be first well searched over and afterwards, a sheet (split if necessary) having been carefully spread below the bushes, a gentle shaking should be administered. Besides these blossoms, heather, ragwort, bugloss, catchfly, bramble, various grasses, and a vast number of other flowers, are wonderfully attractive. In working patches of bloom we should remain stationary and strike as the visitors arrive. Again, over-ripe fruit, the juicy buds of certain trees, sap exuding from wounds in trees, are all more or less attractive. The secretion of aphides, commonly called honey-dew, observable in hot seasons on the leaves of nettles and various other plants and trees, is also well worth attention, and is at times very productive of insects.

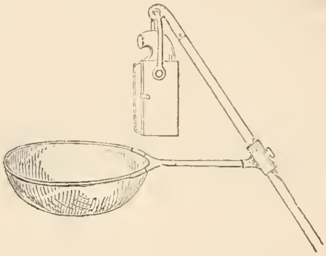

Fig. 78. Lantern and Net.

Sugaring is the next attraction, and a very important one it is. "Sugar" may be prepared by boiling up equal quantities of coarse "foots" sugar and treacle in a sufficient quantity of stale beer, a small quantity of rum being added previous to use, and also, if considered advisable, a flavouring of jargonelle pears, anise-seed, or ginger-grass. This mixture should be applied by means of a small paint-brush to the trunks of trees, to foliage, flowers, tufts of grass, or indeed to any object which may present a suitable surface; for in some localities we are put to shift to know where to spread our sweets. This operation should be performed just before dusk, and soon afterwards the baited spots should be visited and, by the aid of a lantern gently turned on them, examined, a net being held beneath the while. The best form of net for the purpose is formed by socketing two paragon wires into a Y-piece and connecting their diverging extremities by a piece of catgut, as shown in fig. 79. The catgut, being flexible, will adapt itself (see the dotted line) to the surface of a tree trunk when pressed against it. With regard to insects captured at sugar, they are usually remarkably quiet,

Fig. 79. Net for Sugaring.

Fig. 80. Box with linen joints.

and may be boxed without difficulty, and, with a few exceptions, may be conveyed home in the boxes, care being taken to let each have a separate apartment. The boxes should be strengthened with strips of linen pasted round the joints, as shown in fig. 80, otherwise accidents may occur, particularly on wet evenings or on rough ground. The skittish individuals may be best captured by means of the sugaring-drum, of which a cut is given in fig. 81. This apparatus consists of a cylinder, one end of which is covered with gauze, the other provided with a circular valve, which works in a slit. For

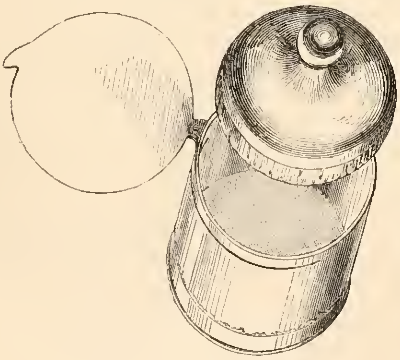

Fig. 81. Sugaring-drum.

use, the valve is opened and the cylinder placed over the insect, which naturally flies towards the gauze; then the valve is closed, the corked piston, shown at the lower part of the cut, placed against it, the valve re-opened, the piston pushed up to the gauze, the insect pinned through the gauze, and the piston withdrawn with the insect transfixed it to.

Light is another most profitable means of attracting. The simplest way is to place a powerful moderator lamp upon a table in front of an open window which faces a good locality, and then wait net in hand for our visitors, which usually make their appearance late in the evening, and continue to arrive until the small hours. Those who prefer

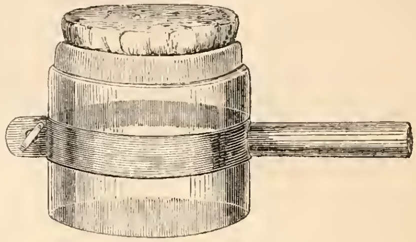

Fig. 82. Cyanide-bottle and Ferrule.

it can use the American moth-trap, which is self-acting, detaining such insects as may enter its portals, or those who can afford the space may fit up a room on the same principle. Street lamps are very profitable in certain localities, and amply reward the collector who perseveringly and minutely examines them. The apparatus depicted in fig. 82 is very useful for taking off such insects as may be on the glass of the lamp: it consists of a cyanide-bottle attached by a ferrule to the end of a sufficiently long stick. When placed over an insect, stupefaction is quickly produced. A net of the shape represented in fig. 83 is also very useful for getting at the various parts of the lamp.

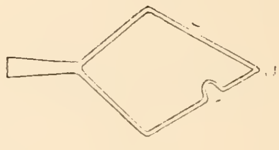

Fig. 83.

The best methods of stupefying and killing insects on the field is the cyanide-bottle, prepared by placing alternate layers of cyanide of potassium and blotting-paper in the bottom of a wide-mouthed bottle, the mouth of which is accurately stopped with a cover, which is better for the purpose than a bung. The chloroform-bottle, which is generally made with a little nipple, through which the fluid flows slowly out, and covered with a screw-top, as in the cut, is also handy. The chloroform should be dropped over perforations in the box containing our patient, these perforations having been previously made by a few stabs of a pen-knife. After the fluid is dropped, our thumb should cover it, when the vapour will quickly enter, and

Fig. 84. Chloroform-bottle.

the inmate speedily become insensible. Afterwards the *coup de grâce* may be given to the insect by pricking it under the thorax with the nib of a steel pen dipped in a saturated solution of oxalic acid. If we are smokers, a puff of tobacco may be blown into the box with like result. If we are destitute of any apparatus, and brimstone lucifers for the purpose of suffocating our captures under an inverted tumbler cannot be obtained at some roadside inn, we must fall back on the barbarous practice of pinching the thoraces of such as cannot be carried home in boxes. At home we shall find the laurel-jar and ammonia-bottle the most useful. The former is made by partially filling a large wide-mouthed bottle or jar with cut and bruised dry leaves of young laurel: if any dampness hang about them, we shall have the mortification of seeing our specimens become mildewed. The latter consists in adding a few lumps of carbonate of ammonia, or some drops of strong liquid ammonia, on a sponge, to the bottle in which our captures, with each box lid slightly opened, have been placed. But it must be borne well in mind, firstly, that ammonia is injurious to colours of most green insects; and secondly, that if the specimens be not well aired after having been thus killed, the pins with which they are transfixed will become brittle and break. Insects should be left in the ammonia for several hours, and are then in the most delightful condition for setting out.

To pin an insect properly is a most important procedure. The moth, if of moderate dimensions, may be rested or held between the thumb and forefinger of the left hand, while the corresponding

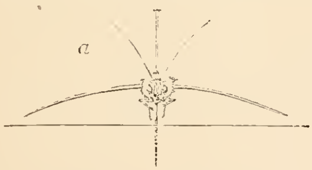

Fig. 85. Front View of properly pinned insect.

digits of the right hand operate by steadily pushing a pin through the thorax, bringing it out between the hind pair of coxæ until sufficient of the pin is exposed beneath to steady the insect in the cabinet.

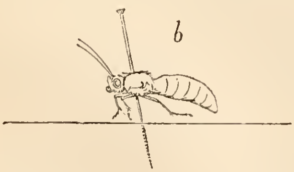

Fig. 86. Side View of ditto.

The direction of the pin should be perpendicular when the insect is viewed from the front, as in fig. 85, *a*; but a lateral view should show the pin slightly slanting forwards, as in fig. 86, *b*. Pins made for the purpose in numerous sizes are sold by Mr. Cooke, of New Oxford Street.

Setting out moths and butterflies is an operation which, if skilfully performed, adds much to the beauty of the future specimens. The method of setting most popular is carried out by means of saddles and braces. These so-called saddles are pieces of cork rounded as in the sectional figure, a

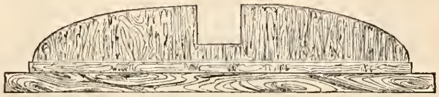

Fig. 87. Cork Saddle for setting out insects.

groove being cut out for the reception of the bodies of the insects: they are generally strengthened by a strip of wood, upon which they are glued. Braces are wedge-shaped pieces of card or thick note-paper, the thick end strengthened, if necessary, with a disk of card fixed by shoemaker's paste, and pierced with a pin through it, as shown in fig. 88.

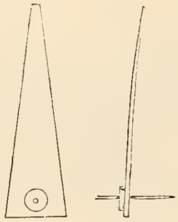

Fig. 88. Braces for setting out.

The mode of application of these appliances is beautifully shown in fig. 90.* But before these straps can be applied, the wings must first be got into position by means of the setting-needle and setting-bristle, which are thus manipulated; the setting-bristle, by the way, being formed by fixing a cat's whisker and a pin into a piece of cork, at the angle shown in fig. 89:—After the

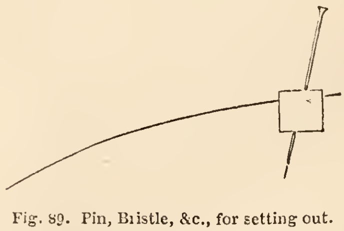

Fig. 89. Pin, Bristle, &c., for setting out.

insect is straightly pinned upon the saddle, and the legs, antennæ, and, if necessary, the tongue, got into position, the left fore-wing is to be pushed or

* This figure and the following have been kindly lent by Messrs. Reeve & Co.

tilted into its place by means of the setting-needle, which is merely a darning-needle with a handle; and simultaneously it is to be held down by the bristle; then a small brace should be applied to the costa of the fore-wing. Next the hind-wing should in like manner be adjusted, and as many braces as are considered necessary to keep the wings in this place should be added. Lastly, the right side of the insect should be treated in a similar way.

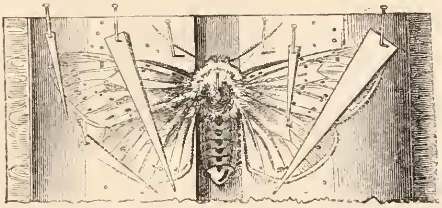

Fig. 90. Moth set out on cork saddle.

A very useful mode of setting, invaluable when we are destitute of saddles, is known as "four-strap" setting, and is well explained in fig. 91.

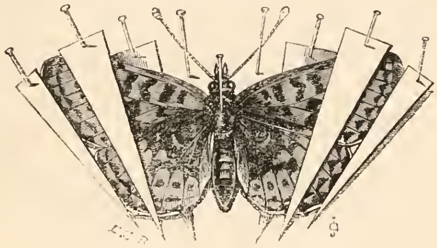

Fig. 91. Four-strap setting.

In this case the lower straps are first put into such a position, that when the insect is placed over them, the middle of each of the costæ will rest upon them; then the wings are got into position, and the second pair of straps are applied over the wings, the latter retaining their position through the elasticity of their costæ: two more straps are generally added to secure the outer borders of the wings, as shown in the drawing; but these, though advantageous, are not absolutely necessary. The saddles, with their contents, should be kept in a drying-house, which is a box adapted for their reception, and freely ventilated, until the specimens are thoroughly dry, when the latter may be cautiously removed, and transferred to the collection.

To preserve our collection from decay, considerable care and attention is necessary. In the first place no insect which is in the least degree suspected of being affected by mites, or mould, or grease, should upon any account be admitted to our collections. It is best to be on the safe side and submit every insect received from correspondents, whether mity or not, to quarantine, by which is meant their detention for a few weeks in a box the atmosphere of which is impregnated with some vapour destructive to insect life; such as that of benzole. Our own specimens we should kyanize by touching the bodies of each with a camel's-hair brush dipped in a solution of bichloride of mercury of the strength six grains to the ounce of spirits of wine,—no stronger.

As for mould, it is best destroyed by the application of phænic or carbolic acid, mixed with three parts of ether or spirit. As preventives, the specimens should be kyanized as above. Caution in the use of laurel as a killing agent must be exercised, and the collection must be kept in a dry room.

Grease may be removed by soaking the insects in pure rectified naphtha or benzole, even by boiling them in it if necessary. When the bodies only are greasy, they may be broken off, numbered, and treated as above. After the grease is thoroughly softened, the insects should be covered up in powdered pipeclay or French chalk, which may be subsequently removed by means of a small sable brush. As a precaution against grease, it is advisable to remove the contents of the abdomina by slitting up the latter beneath with a finely-pointed pair of scissors before they are thorough-dry, and packing the cavities with cotton-wool. The males, especially of such species as have internal feeding larvæ, should be thus treated.

Some prefer to keep their collections in well-made store-boxes, which possess many advantages over the cabinet; for example, they may be kept like books in a bookcase, the upright position rendering the contents less liable to the attacks of mites; they are more readily referred to, and are more portable, and they admit of our gradually expanding our collections to any extent. Cabinets, on the other hand, are preferred by many, for the reasons that they are compact and generally form a handsome article of furniture; moreover, good cabinets are made entirely of mahogany, which is the best wood for the purpose; deal, and other woods containing resinous matter, having a decidedly injurious effect on the specimens. As a preservative, there is, after all, perhaps nothing better than camphor; but it should be used sparingly, or its tendency will be to cause greasiness of the specimens.

ART IN ITS RELATION TO NATURAL SCIENCE.

PAINTINGS, and works of art generally, have not hitherto been introduced into SCIENCE-GOSSIP, but, on reflection, it appears that the fine arts would be advanced by the application of science to them. Anatomy, perspective, the geological structure of rocks, the principles on which water finds its level and also is conformable to the rotundity of the earth, natural history, and especially botany, are needful for the accomplishment of artists in their several departments. In fact, truth, which science asserts, is the soul of painting and poetry alike; and no real and substantial feeling of grace or beauty, in any of her forms, can be divorced from it.

We shall, therefore, consider it to be strictly within the province of SCIENCE-GOSSIP to endeavour to eliminate from every branch of art the enormities which have been perpetrated under her guise, such as horses galloping with their four legs distended like rocking-horses, flowers and plants mere apologies for their originals, &c.

In commencing the application of science to works of art, we propose to deal very gently with those exhibited this year at the Royal Academy, and to do little more than indicate some marked errors. No. 25, by Sir E. Landseer, R.A., is a charming but rather sketchy portrait of Lady Emily Peel, seated, with her dogs, deservedly favourites, courting her notice on either side. The artist has paid little attention to the flowers at her feet, as little apparently as the dog which in its haste to reach its mistress has upset the vase which contained them. This is a pretty episode; but it is vain for Sir Edwin to divert our attention from the flowers by the charming portraiture of the lady. Nature seems to assert her rights and to claim for her flowers a fair delineation, not as photographs, nor as principals in the picture, but such as is truthful and pleasing, and not to leave it necessary to ask what they are intended for. No. 223, "Hearts are Trumps: Portraits of Elizabeth, Diana, and Mary, Daughters of Walter Armstrong, Esq.," J. E. Millais, R.A. This gorgeous painting, perhaps the best that the artist has ever produced, is entirely free from the defects of No. 25. The exquisite flowers on the one side are most artistically set off by the screen on the other, under which the ladies are seated at their game of cards. As they are portraits, they do not admit of the criticism which would attach to one of them at least, who holds the king of hearts, but does not seem to be delighted, scarcely contented, with her good luck. The sister, who holds the fewest hearts, appears the most contented. Had the subject been ideal, it would have been open to criticism on this score; but, as it is, it is difficult to find fault with it, and we anticipate that it will be one of the chief attractions in the exhibition. No. 6, "In the Valley of Rocks, North Devon," T. G. Cooper. We have much pleaure in singling this out among many as a faithful representation of the geological structure of the rocks, at the same time that the artist proves that he is alive to the sentimental by his placing the right hand of the shepherdess upon the neck of a lamb, and a nosegay of wild flowers in her left. No. 130, "Passing Clouds, near Capel Carig, North Wales," B. W. Leader. For the same reason we call attention to this picture as very beautiful, and geologically correct, and we repeat our conviction, that the more closely and scientifically the geological features are represented, the greater will be the pictorial charm. Time will not allow me to specify the many excellent pictures in which the rules of science may be said to be faithfully carried out. I will only mention the "Yew-trees of Borrowdale," by E. A. Pettitt, a most effective painting, but in which the natural colours are slightly departed from. No. 658, "My Punishment is greater than I can bear," G. F. Watts, R.A. The anatomical correctness of this gigantic work is, perhaps, open to censure, and we do not regret that it is deposited in the Academy, where it will be out of sight

A FEW OBSERVATIONS ON THE SMOOTH NEWT.

(*Lissotriton punctatus.*)

On the 29th of May last (1871) I obtained a female Smooth Newt (*Lissotriton punctatus*), and observing it to be big-bellied, conjectured that it had not yet laid its eggs. In this I was not mis taken, but, notwithstanding my close attention, was unable to discover it in the act of depositing them. This, probably, was owing to my ignorance of the manner in which they were deposited, my idea being that they were laid in some such manner as those of the frog or toad—viz., in spawn. The way in which they are deposited, and their further development into the tadpole phase of their existence, form the subject of this short paper.

On receiving the Newt it was put into a large rectangular aquarium, containing about three gallons of water, and having in its centre a piece of artificial rockwork in the form of an arch. Disposed throughout were a number of plants of *Vallisneria spiralis*, *Callitriche verna*, and *C. autumnalis;* also some water-moss upon the rockwork and at its base. I frequently observed the Newt among the plants, but nothing else being noticed, I began to think I had been mistaken in my supposition of its being an impregnated female; and it was not until the 17th of June that anything transpired to confirm my first impression. On the afternoon of that day, however, while watching the aquarium, which, besides the Newt, contained a few minnows, loaches, and a large number of frog-tadpoles, my eye caught something darting about, scarcely visible but for the bright golden eyes which ever and anon glanced like gems, as the colourless sprite darted hither and thither. It must ultimately have fallen a victim to some of the fish, as I shortly after lost sight of it, never again to see it; or, indeed, any other in this aquarium. Subsequent experience proved that the minute newt-tadpole was included in the frog-tadpole's bill of fare, which, by the way, is very comprehensive, a disabled member of its own community not being objected to. The aquarium had a few days previously been cleaned out, the plants thinned, and a few sprigs of *Callitriche verna*, which had some of their leaves folded down, and kept in that position, I had placed in a small bottle with water. On looking at them I found the leaves a little separated, and within the enfoldure

Fig. 92. *Callitriche verna*, with leaves containing ova of Newt.

something resembling a small caterpillar snugly coiled up in its cocoon. Suspecting what they really were, I kept a close watch on their development, and was not disappointed, as they proved to be the young of the Newt, and were curious and interesting objects for study. The following is my diary of observation :—

June 12 (11 a.m.).—One of the germs, which I suppose to be those of the Smooth Newt, was hatched. It was about three-eighths of an inch long; head obtuse, rounded; eyes large and brilliant, black, with bright golden irides; colour of body, pale yellow or amber; two dark-coloured streaks, commencing on head, and combining at the point where the tail commences, were continued to its end, which was as fine as a needle's point. Underneath was a dark streak, formed, I think, by the intestines; behind the head, on either side, was a delicate fringe—the *branchiæ* (breathing organs), consisting of several points directed outward and backward, and so transparent as barely to be visible. From the same point, along the centre of the back, ran a fin, more transparent still—so transparent as to be invisible, except in certain lights, and with the aid of a magnifying-glass.

Development of Germ.—It was inclosed in a globular jelly-like substance, which expanded at its growth;

Fig. 93. Showing different stages in development of ova, from 1 to 4, &c.

the two halves of the leaf separating at the same time, and showing the tadpole neatly coiled up, with its head and tail in close proximity. From the position and appearance of the eggs, I should suppose them to be covered outwardly with a glutinous substance, which, when the egg was laid in the fold of the leaf, and the halves compressed, adhered to them, thus keeping the leaf in that position. As the tadpole increased in size, however, it required more space, and with its growth the two portions of the leaf separated, thus allowing the water a freer access to the egg, and determining its shape, which appeared to be that of a perfect sphere. The furthest developed one was, in its outer part, the half of a perfect sphere; while the inner half, still in the double of the leaf, was compressed and elongated, giving to the whole egg a pear-shape. See fig. 93, *a*, &c.

June 23.—The tadpole occasionally changed its position in the egg; the head and tail, however, always keeping in same position, near together. After twice rapidly changing its position in the egg, the head of the tadpole burst the envelope, and, after a few moments' rest, it dropped slowly out, and resting with its head between a leaf and the side of the bottle, was in a most favourable posture for observation. I could now see the branchiæ and fin with the unassisted eye, and found that, in addition to the back-fin, another ran along the under-side of the tail from the vent. After remaining in this position for a few minutes, it darted away stickleback-like. Immediately after its coming out, the egg collapsed, and on examination I found it to consist of a transparent substance, much resembling gelatine, and no larger (when out of the water) than an ordinary-sized pin's-head; thus favouring the opinion of its expansion by the absorbing of water during the development of the germ.

June 24.—Those hatched lay quietly at the bottom of the water, rarely moving unless disturbed. Two more developed, both occasionally moved, the movement being a turning of the body half, or more than half, round in the egg; it, however, was so quick as to elude defining. June 28.—All the eggs now hatched. July 2.—All the young got fore-feet, which were very pale and transparent, so much so, indeed, as barely to be visible. The largest was nearly half an inch long, the shortest three-eighths ditto. July 5.—All the young nearly of the same size. The head, legs, feet, and branchiæ were all covered with minute dark-coloured dots; those on the head brown, as were also the two streaks, which, running the whole length of the body, then combined and continued in one to the end of the tail. These were, as I afterwards found, composed of a multitude of these minute dots. The head was large, and branchiæ more developed; the legs longer, and toes long in proportion, the middle one (only three visible) being much the longest, and almost equal in length to the rest of the leg; the whole not exceeding 2-12ths of an inch. The germs had the power of bending the body to either side, and also of elevating the posterior part. When they moved, they did so by quick, short starts forward. July 11.—No observable change. July 18. —A little larger, and tail-fin spotted, or rather dotted. July 21.—The young were kept in a vessel amongst decaying vegetable matter, which fostered a growth of Confervæ, amongst which the tadpoles became entangled. On disengaging them they were still living, but died shortly after; thus bringing my interesting observations to a close. In closing I may add, that during the whole period from their discovery both eggs and tadpoles were kept out of doors in the open air.

Newcastle-upon-Tyne. C. R. E.

NEW BOOKS.*

THERE are few greater luxuries to a literary naturalist than that of cutting the leaves of such a splendid volume as that which heads our list. The paper-knife would fain linger long over its work, and drops listlessly out of the hand when the last page has been severed! To a student this work is indeed a treasure. On no subject in marine zoology have more mistakes been made than in the natural history of Corals. For years past some of the best naturalists in all countries have been working on them. Milne-Edwards, Haines, Darwin, Duncan, Dana, Agassiz, Pourtales, and others have contributed memoirs. Our fossil corals have been better illustrated than our recent, as witness the magnificent volumes of the Palæontographical Society. No other class of marine objects throws such light over past history, over the temperature and other physical conditions of primeval seas, as corals. With Darwin's wonderful generalizations before us, out of the fossil corals of our Silurian and carboniferous limestone hills it becomes tolerably easy to describe the physical geography of the seas in which those limestones were deposited. And yet, with all the importance attached to corals, and in spite of all that has been written about them, as well as the erroneous notion abroad concerning these interesting organisms, we have had hitherto no manual specially devoted to their consideration. The student has been forced to wade toilsomely through the scientific memoirs of his own and other tongues, if haply he might find what he sought after. Hence it is that we hail this volume as a boon to the student; as a splendid manual on coral-zoology, finely illustrated, and written by a man who perhaps knows more about the practical natural history and literature of the subject than any other philosopher.

Professor Dana's work enters minutely into the relations between the Hydroids, Bryozoans, &c., and Corals—the non-coral-making actinoid Polyps, as well as the coral-making—that is, between the sea-anemones which deposit no lime, and the coral animals which do. The chapter on "Life and Death in concurrent Progress in Coral Zoophytes" is deeply interesting, and we should gladly transcribe it for our readers, did space permit. Perhaps the most interesting part of the work, however, is that which treats on Reef-forming Corals, and the causes which influence their growth and distribution in latitude, depth, &c. The principal coral reefs and islands throughout the globe are particularized, the author having personally visited the most important. The formation, rate of growth, and origin of coral reefs, are elaborately treated on at considerable length. We have said enough, however, to indicate to the student a valuable work, one that will help the zoologist nearly as much as the geologist. We proceed to quote a few paragraphs relative to the mode in which the genera of some of the commonest compound corals grow to their mature sizes. Speaking on this important subject, Prof. Dana says:—"When the budding is not confined to any particular polyp or cluster of polyps, but takes place universally through the growing mass, the coral formed is more or less nearly hemi-

* "Corals and Coral Islands." By James D. Dana, LL.D. London: Sampson Low & Co. 1872.

"Botany for Beginners." By Maxwell T. Masters, M.D., F.R.S. London: Bradbury, Evans, & Co. 1872.

"May Flowers." By the Rev. James Harris, M.A. London: Griffith & Farran. 1872.

spherical; and often the process goes on with such extreme regularity that these hemispheres are perfectly symmetrical, even when enlarged to a diameter of ten or fifteen feet. In the growth of these hemispheres, the enlargement takes place in the spaces between the polyps; and whenever these spaces begin to exceed the width usual to the species, a new mouth opens, commencing a new polyp; and thus the growth of the mass involves multiplication of buds. Species of *Porites* also grow into hemispheres and rude hillock-like forms through the same method of budding, and some of the masses in the tropical Pacific have a diameter of even twenty feet. Myriads of living polyps are combined in a single such mass, for each is but the fifteenth or a twentieth of an inch in diameter. Besides this method of budding, there is also a kind of superior budding called *spontaneous fission*, which consists in a spontaneous subdivision of a polyp, by which two are made out of one. This spontaneous fission is the common kind of *budding* in the large *Astrea* tribe. Many of the *astrea* hemispheres of the Pacific, grown by this method, have a diameter of ten or fifteen feet. . . Sometimes, when a new mouth forms in an enlarging disk, there is not at once a separation of the two, but the disk continues to enlarge in one direction and another, and then another mouth opens, and so on until a string of mouths exists in one elongated disk; and, finally, a separation occurs, but only to commence or carry forward another long series. In this way the corals with meandrine furrows are made, some kinds of which are popularly called Brain-corals, and pertain to the *Meandrina* family. In all such species the tentacles stand in a line on either side of the line of mouths."

Dr. Masters's little book appears to us to come up to what it professes to be—a "Botany for Beginners,"—better than any we have yet seen. It is written in simple, yet attractive English. The illustrations are numerous and good, and every one serves as a useful text for further enlargement. The author is a botanist of high standing, and his experience as a lecturer enables him to introduce his remarks to the student in an untechnical, and yet scientific manner. The most remarkable feature in this book is the correlation of the various details, all taken from simple and familiar flowers, and the modifications which each part has undergone in different plants. The fact that the woodcuts are by Mr. Worthington Smith will be a sufficient voucher for their correctness and finish.

The Rev. Mr. Harris's little *brochure*—"May Flowers,"—is what it calls itself,—a popular and scientific description of the wild flowers of the month, with their habitats, properties, &c. It is cheerfully and pleasantly written, varied by a good deal of original folk-lore, and cannot fail to interest young beginners in the charming science of Botany.

A GOSSIP ABOUT THE HAWFINCH.

As several of the contributors of Science-Gossip last year took some interest in the Hawfinch, perhaps a few remarks concerning it in an aviary may be acceptable. The Hawfinch, although not plentifully found, is not considered a rare bird: some few are sometimes seen in Epping Forest, where its nest is annually taken.

It is generally believed that it destroys small birds, and so cannot be trusted in an aviary. Such is not the case. I have kept it for months with canaries, finches, tits, and warblers, without the least injury to any.

When first taken it is rather shy, but does not dash about as most small birds do; if kept in a small cage, it sits with a somewhat timid, pensive look, and if approached, will tighten its feathers, open its large mouth, and stand quite defiant; of course, in an aviary it makes off at once, but in a short time it becomes tame and sings a few coarse notes, but not louder than those of the Bullfinch. When thoroughly established, it will allow you to approach very near it, and even to pass under the branch it may be standing upon; at night, similar to the Bullfinch, you may do almost what you like (short of touching him), as the Hawfinch rarely moves. On going from place to place, the rest of the birds seem to keep clear of the Hawfinch; when at the feeding-pan, other birds do not approach; for although it is so inoffensive, most of the birds fear it, with this exception, sometimes the Blue Tit will dine at the same time, and at the same dish; *Parus cæruleus* will cling to the edge of the feeding-pan supported by his tail, until fairly driven away by the Hawfinch with open mouth.

The food of the Hawfinch is hemp and canary-seed, with sop-bread and milk; kernels of the plum are greedily devoured: a plentiful supply of water is necessary, as he is fond of bathing.

Being above the ordinary size of finches, he is somewhat ornamental and always to be seen; and though his colours are not the brightest of his species, he is not a little attractive. The Hawfinch is rather a clumsy-looking bird, with a large head, and bill of extraordinary thickness and of great strength, of a flesh-colour in winter, and becoming a deep blue in spring. The head is a light brown; the throat and feathers round the base of bill black; the back a dark brown; the wings marked with white, something like the Chaffinch; the tail short, under-part pale brown; plumage soft and blended; its flight is swift, and it alights peculiarly heavy for a bird of its size. The nest of the Hawfinch is rather loosely built; the young have a spotted breast, something like a young thrush, but the white and glossy feathers of the wings are almost as bright as in the old ones. The nestlings should be put in a dark cage, with some hay to keep them clean and warm. Feed them upon scalded bread and rape-seed, mixed with the yolk of hard-boiled egg. The rape-seed should be soaked for twelve hours, then simmered for a few minutes, then strained and rolled with rolling-pin, taking care to get as many of the husks away as possible: it will then be ready for mixing. This preparation will do for almost any kind of young birds: they should be fed every two hours, from early morn until sunset.

The Hawfinch so brought up will answer to a name if frequently mentioned at feeding-time. I have heard of them imitating a few words; and indeed the formation of the bill seems to favour such a remark. Those I brought up from the nest made an attempt, but I am sorry to say I cannot give any account of their ability, as they died in moulting. My impression is that they could talk.

C. J. W. RUDD.

THE PRODUCTS OF WASTE.

THE number of important commercial products now manufactured from materials which were formerly thrown away, being at first sight valueless and repulsive, has within the last ten years been marvellously increased.

Those gorgeous colours the aniline dyes, exhibiting almost every shade of the solar spectrum; stupendous blocks of alum; beautiful yellow and red crystalline masses of ferro- and ferri-cyanide of potassium; enormous cakes of paraffin, a chemical curiosity a few years ago, but now one of the largest of our manufactures; the variety of lucifer-matches in connection with the development and production of phosphorus; the almost endless combinations for artificial manures; the still greater assortment of paper in its useful applications;—all these might have been seen together in the last exhibition, though but few perhaps of the many thousands who gazed with pleasure at that interesting collection were aware that they were mere chemical products of the dust-heap and sewer. Dirt has been aptly defined as valuable matter in the wrong place; and that such is the truth is evident from the fact that all the manufactures first alluded to, as well as those of Prussian blue, disinfectants, glue, &c., have sprung into existence by the application of chemical principles to such waste products as coal-tar, gas-water, rags, and bones. In the destructive distillation of coal for the production of ordinary gas, a quantity of offensively-smelling water and a considerable bulk of tarry matter are also produced. These were formerly thrown away as useless and deleterious, but now they are utilized.

The noxious odour of the gas-water is due to the presence of sulphur and ammonium compounds, and by simply adding sufficient quicklime the alkaline compounds are decomposed and ammonia gas is liberated. This is conducted into chambers filled with carbonic acid gas, and thus the common salt, known as carbonate of ammonium, is produced. More than 2,000 tons of this useful chemical are annually made from refuse gas-water. If instead of quicklime, hydrochloric acid be added, sal-ammoniac is obtained, from which nearly all the medicinal preparations of ammonia are produced. The quantity of sal-ammoniac thus manufactured from year to year exceeds 4,000 tons. If again sulphuric acid be employed in the place of hydrochloric acid, sulphate of ammonium is the result, about 5,000 tons of which are annually used for manures. When to a solution of sulphate of ammonium, one of sulphate of aluminium is added, the crystalline substance called alum is obtained, so generally useful in the arts. The sulphuric acid used in preparing alum may also be eliminated from gas-water. The sulphur impurities referred to before are removed by means of a mixture of sawdust and iron, sulphide of iron and water being produced; air is then passed through the mixture, the effect of which is to convert the sulphide of iron back again into oxide, the sulphur at the same time separating in the form of powder. The sulphur is then burned in a properly constructed furnace, and by causing the fumes to combine with nitrous and aqueous vapours in leaden chambers, sulphuric acid is obtained.

Let us pass now to the tarry matter, the other waste product of the distillation of coal. This is a very complex body, containing a large number of substances, most of which are volatile, some acid, some alkaline, and some neutral. By appropriate chemical means these components of crude coal-tar are obtained in a state of purity. The lighter portions, known as coal-naphtha, consist principally of benzol, a liquid of great utility in the arts. By treating benzol with nitric acid, nitro-benzol is produced, which is used, on account of its sweet taste and almond-like odour, to perfume soaps and flavour confectionery. Aniline, the base of all the dyes bearing that name, is obtained from the action of nascent hydrogen on nitro-benzol. Carbolic acid is another product of the fractional distillation of coal-tar. By the action of nitric acid, carbolic acid is converted into carbazotic acid, which is now used as a yellow dye. Perhaps the most interesting of all the products of coal-tar is solid paraffin, a colourless crystalline fatty substance, which may truly be termed "condensed coal-gas." It is found naturally in the coal-measures and other bituminous strata, constituting the minerals known as fossil wax, ozokerit, &c. It exists also in solution in many kinds of petroleum, and may be obtained by distilling off the more volatile portions and exposing the remainder to a low temperature. The greater bulk of paraffin is, however, obtained from coal-tar. The oil produced from paraffin will only burn in the presence of a wick, and is therefore perfectly safe; when burning, it splits up into olefiant gas, thus producing a brilliant white light. To sum up: from the two waste products of coal in the manufacture of gas are obtained carbonate, chloride, and sulphate of ammonium, sulphur and sulphuric acid, coal-naphtha, benzol, nitro-benzol, aniline, carbolic and carbazotic acids, and solid paraffin.

The next division of this interesting subject is rags. First and foremost of the many applications of this humble material is the manufacture of paper; for this purpose we buy from other nations no less than 15,000 tons of rags annually, besides using 70,000 tons from the waste of our own population; the whole representing a money value of £700,000. The transformation effected by the action of certain chemicals on paper is very striking. A sheet of common white blotting-paper, which will scarcely bear its own weight when wetted, is converted in a few seconds by the action of sulphuric acid into a substance possessing all the properties of ordinary animal parchment, and so strong that it can be only broken with difficulty. Great as this change is, strange to say, no chemical alteration has really taken place; the acid merely produces a molecular change, and is entirely washed away at the end of the process. Rags from woollen materials undergo many peculiar metamorphoses; old clo' criers first collect them; they are then successively converted into mungo, shoddy, and devil's dust, and reappear as ladies' superfine cloth; they then degenerate into druggets, and are finally used for the manufacture of flock-paper. After undergoing all these transformations they are used by the agriculturist as manure, on account of the large amount of nitrogen they contain. The presence of this element makes them of great use also to the chemical manufacturer; he boils them down with pearlash, horns and hoofs of cattle, old iron hoops, blood, clippings of leather, and broken horseshoes, and produces the beautiful yellow and red salts known as the prussiates of potash. From these again the rich and valuable pigment called Prussian blue is made; and thus do our old rags enter upon a fresh career of beauty and usefulness, to form in their turn other waste products, which may again be utilized through the power of man's intelligence.

The vast and important subject of bones now demands attention. Of these we import more than £400,000 worth, and the uses to which they are applied are endless. Bones are composed of half their weight of phosphate of lime, about a third of their weight of cartilage or gelatine, and the remainder of earthy matters. The gelatine is extracted by boiling water under pressure, and is used to stiffen calico, &c.; when purified, it constitutes the nutritious aliment known as calf's-foot jelly.

When bones are heated without access of air, the organic matter of the cartilage is decomposed, oily products passing over, and a black carbonaceous residue being left: this is bone-black, or animal charcoal, greatly used as a deodorizer and disinfectant. Bones, when calcined and heated with sulphuric acid, yield superphosphate of lime, so highly esteemed as a manure. The last and certainly the most important application of bones is the manufacture of phosphorus. The bones are first burnt to remove all traces of animal matter; the resulting bone-earth, as it is called, is then subjected to the action of sulphuric acid, by which superphosphate of lime is produced. This acid phosphate is then mixed with charcoal and strongly heated in a retort, when it splits up into normal phosphate and phosphoric acid, the latter being finally reduced by the charcoal to phosphorus, while hydrogen and carbonic oxide are liberated as gases. The combustible and poisonous properties of phosphorus make it very dangerous to employ in the arts; but Professor Schrötter discovered that when ordinary phosphorus was heated for some time in a closed vessel to a temperature of 470° it lost its power of igniting spontaneously and became of a deep red colour. By making use of this discovery, matches can now be made without danger either to those who manufacture them or to those who use them. The safety-match is made by putting the oxidizing material alone on the match, the red phosphorus being mixed with emery and pasted on the side of the box.

We have thus mentioned a few of the valuable applications of substances which some years ago were looked upon as utterly worthless. Coal-tar, rags, and bones rise from the sewer and dust-heap, and are transformed by chemistry into gorgeous luxuries and necessities of civilization, giving employment in their transformations to thousands of our working classes. C. Leicester.

ON THE ECONOMY OF THE FRESH-WATER POLYP.

Having for more than two years past had a number of Hydras in small glass aquaria under my (I might almost say daily) observation, I thought, simple and limited as those observations may be, that they perhaps would prove interesting to the readers of Science-Gossip. The Hydras are most interesting animals, and have long attracted the attention of naturalists generally, on account of their extraordinary powers of reproduction. The *Hydra vulgaris*, which is the same as I have in my glasses, was discovered by Leeuwenhok, in 1703; but its wonderful power of digestion, and of multiplication after division, were first discovered by Trembley in 1740.

Having noticed, at the end of last December, that a number of Hydras in my aquarium had become studded with white hemispherical-shaped lumps, rather prominently raised in the centre (as shown in fig. 94, *a*), I took some of them out of the water, and examined them under the microscope in a shallow cell; when I observed in the extreme tips of those lumps a number of moving objects, having the appearance of so many minute animalcules, which kept up continual and rapid movements. After a time, I distinctly saw an eruption of some of those protuberances, and springing out from them, with considerable force, a number of those moving objects (fig. 94, *b*), which appeared to disperse themselves in the water around the Hydra. At that time the Hydra did not take food, and the tentacles gradually contracted, and finally the whole body dissolved into a confused mass of whitish granules.

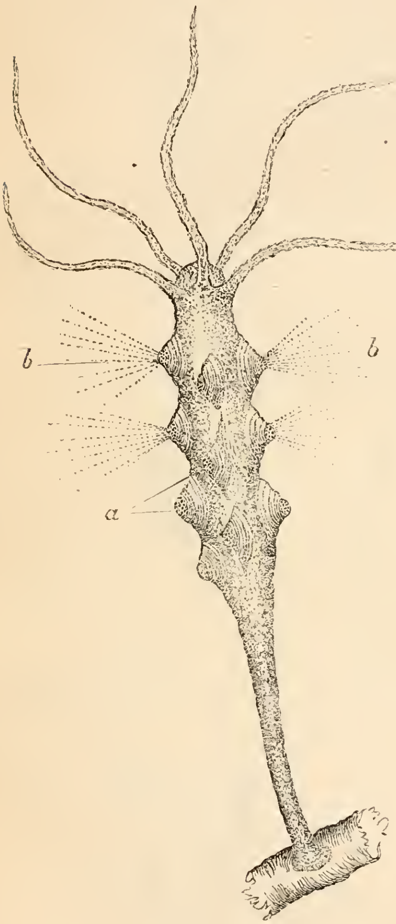

Fig. 94. Hydra, showing prominences *a*, and *b* eruptions.

Now the question arose in my mind as to what these living moving things could be that occupied the lumps and finally escaped into the water surrounding the body of the Hydra. Were they the spermatozoa escaping from the sperm-cells fertilizing the ova in the ovi-sacs? Both the sperm-cells and ovi-sacs are to be found on the same polyp, and at its final dissolution the ovum sinks to the bottom and lies hidden in the mud, from which ovum the Hydra is reproduced in the following spring. This appears to me to be the case, and though this manner of the formation of the Hydras from ova has never been traced or witnessed, yet I think we have reason to conclude that this is the fact, as after the disappearance of the Hydras in the autumn, I have during the winter closely examined the water and plants growing in it, and have not been able to find one single Hydra; and then again in the spring, I have observed a very few small ones indeed, and after a time have found them increasing by gemmation or budding, which is the usual manner of their

Fig. 95. First stage in development of Hydra.

propagation during the summer months. All this can be witnessed by any one during the summer by keeping them in a small aquarium under observation. The reason why I think the small Hydras that make their appearance first in the spring are produced from ova is the fact that, when produced by budding, I have always observed that the young

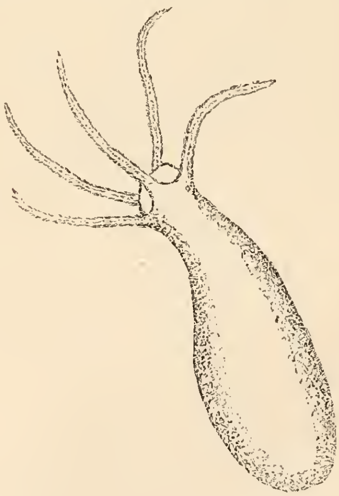

Fig. 96. Second stage in development of Hydra.

ones do not leave the parent stem until they are full-grown, and as large as the parent itself; and even sometimes a bud is seen on the young one before it leaves the parent stem. So I conclude that those very small ones which first appear are produced from the ova. Some of them when first observed are a mere rounded lump, showing the tentacles like a star (as shown on fig. 95), others I find as it were in a more advanced state, as that marked fig. 96, but without a footstalk or sucking disk. And again others with a very short footstalk, as in fig. 97; and so on until they commence budding

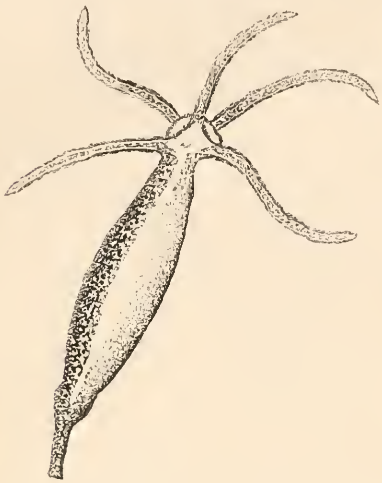

Fig. 97. Development of Foot-stalk.

in the usual way. So I think it very feasible that

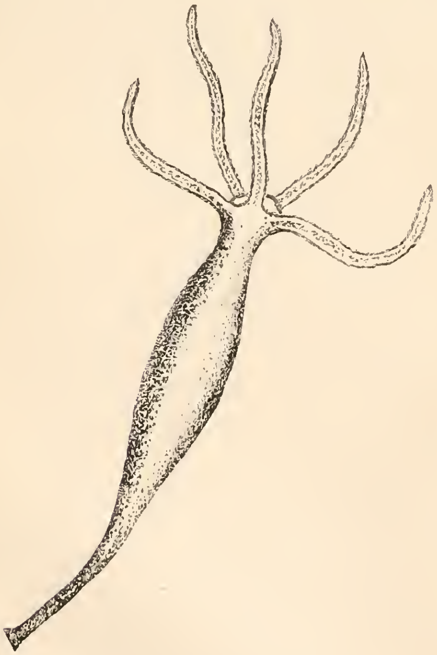

Fig. 98. Development of Foot-stalk.

the small Hydras that appear in the early spring are produced from ova. There is another way of multiplying the Hydra besides gemmation and ovation, which is by mechanical subdivisions; that is, by cutting them into slips as you would plants. This I have proved several times, and now have some on which I have tried the experiment. In one

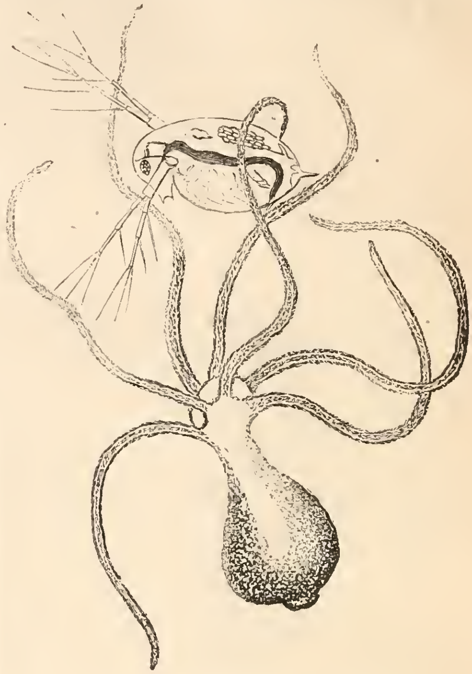

Fig. 99. Hydra attacking Water-flea.

glass there are eight Hydras which are the results of my cutting four into parts. Cutting them does

Fig. 100. Hydra without tentacles.

not appear to affect them much, for the part containing the tentacles, when severed, sinks gradually to the bottom of the glass, with the tentacles still extended. And should a water-flea come within the reach of the tentacles, they readily seize it and

Fig. 101. Hydra after cutting.

draw it to the mouth of the polyp. The flea will struggle with the polyp, and will drag it about at

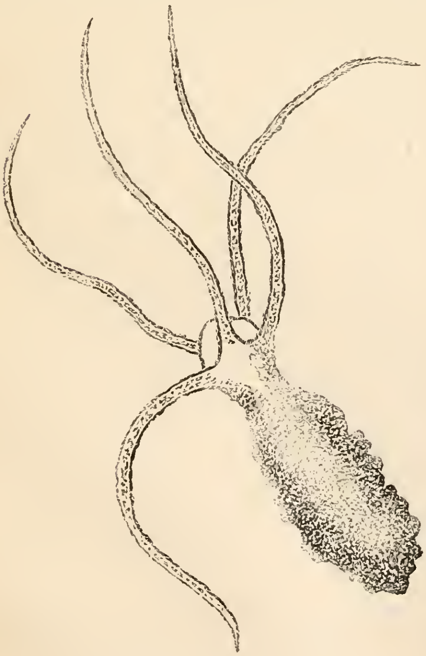

Fig. 102. Hydra three hours after cutting.

the bottom of the glass, as the Hydra has no foot-stalk or sucker to hold on with, being cut asunder.

But, however, it holds fast on the flea, and finally absorbs it. The foot-part of the severed Hydra still continues to hold on to the plant or side of the glass where it was fixed when it was cut in two; and, stretching out its full length, patiently waits until a new head and tentacles are formed, before it can catch its prey to satisfy its appetite. I have figured the forms of some of the polyps three hours after being cut in two. I have seen the tentacles reproduced in a few hours after the operation, sufficient to enable the Hydra to catch and absorb the water-flea. In one of my glasses are several Hydras the results of my cutting two to pieces; one I cut in two, the other I cut into several pieces, and they are all restored to perfect animals.

JAMES FULLAGAR.

MICROSCOPY.

LIST OF FORMS IN MÖLLER'S DIATOMACEEN PROBE PLATTE.—Triceratium Favus, Pinnularia nobilis, Navicula Lyra, Navicula Lyra, var., Pinnularia interrupta, 1-inch objective; Stauroneis Phœnicenteron, Grammatophora marina, Pleurosig a Balticum, $\frac{1}{2}$-inch ditto; Pleurosigma acuminatum, Pleurosigma angulatum, $\frac{1}{4}$-inch ditto; Pleurosigma fasciola, Grammatophora subtilissima, Surirella gemma, Nitzschia sigmoidea, $\frac{1}{8}$-inch ditto; Cymatopleura elliptica; Navicula crassinervis, $\frac{1}{12}$-inch ditto; Nitzschia curvula, $\frac{1}{4}$-inch ditto; Amphipleura pellucida, $\frac{1}{16}$-inch ditto. The above is a copy of Möller's list, with the powers usually necessary to resolve the forms; but, being mounted in balsam, the striæ are much more difficult to resolve than when mounted dry. *Nitzschia curvula* (Smith) of lists is not that form, but *N. sigma* of Smith, The former is not a Nitzschia, but a Surirella,—the *S. intermedia* of Dr. Lewis. The illuminating ray requires to be more or less oblique in all cases where the objective is less than $\frac{1}{8}$.

FUNGOID GROWTHS ON LEAVES OF COLEUS.—A paper was read before the Royal Microscopical Society, by Mr. H. J. Slack, F.G.S., &c., on the supposed fungus on Coleus leaves. A microscopic examination of the leaves revealed certain peculiar appearances on their under surfaces, which had hitherto been attributed to fungoid growths. When a leaf of a Coleus is examined by means of a lens, a number of globular bodies of a beautiful yellow tint, highly translucent and refractive, and the majority of them marked with a cross like that impressed on the well-known cross-bun, may be detected. These bodies are pretty uniformly distributed, without any regard to the variegations of the leaf-colouring matter. The colours of these bodies, when healthy and well filled with their refractive matter, varied from a rich topaz to a pale sherry tint, and they glittered like jewels when well lit up. Empty cells rudely resembled a mushroom in form, with a stout stem and a round head marked with a cross, but the texture did not look in the least fungoid, nor could any mycelium be detected on the leaves. The author details a series of observations on leaves of many varieties of Coleus, and in all stages of growth, and has come to the conclusion that these supposed parasitic growths are in reality only glandular hairs, similar to those on *Mentha viridis* (garden mint), &c. Dr. Braithwaite suggested that they might contain the matter producing the fœtid odour possessed by the Coleus plants.—*Monthly Microscopical Journal*, Part XIII.

Our readers, particularly those interested in the Diatomaceæ and Desmideæ, will learn with regret the death of M. Louis Alphonse de Brebisson, of Falaise, and formerly Councillor-General of Calvados. He was author of various papers on the Diatomaceæ, &c., and was member of many scientific societies. Of late years he devoted himself almost entirely to the study of the Diatomaceæ, and was one of the very few, perhaps the only Frenchman, who made those organisms the subject of really scientific investigation. He was always ready to impart any information or gatherings to those interested in the simpler forms of vegetable life, as the acknowledgments of Kützing, Rabenhorst, Ralfs, Smith, and others testify. The writer of this notice would also record his obligations to him for the frequent supply of specimens and material. He departed this life at his residence, on the 25th day of April, in the 74th year of his age.—*F. K.*

Drum of the Ear of the Frog.—Mr. C. Baker, of Holborn, has just published some transparent injected preparations of this organ. These slides, besides exhibiting the ramifications of the capillaries, admirably display the pigment-cells; the cartilaginous structure is also well defined when the object is examined by polarized light. A paper on the organs of hearing in frogs, by Dr. C. Hesse, of Würzburg, will be found in Siebold and Kolliker's "Zeitschrift für wissenschaftliche Zoologie," Part III.

Dr. Beale's formula for the preparation of the carmine solution is as follows:—Ten grains of carmine in small fragments are to be placed in a test-tube, and half a drachm of strong liquor ammoniæ added by agitation, and the heat of a spirit-lamp; the carmine is soon dissolved, and the liquid, after boiling a few seconds, is to be allowed to cool. After the lapse of an hour, much of the excess of ammonia will have escaped. The solution is then to be mixed with 2 oz. of distilled water, 2 oz. of glycerine, ¼ oz. of alcohol. The whole may be passed through a filter or allowed to stand for some time; the perfectly clear supernatant fluid may be poured off and kept for use.

I do not think it is generally known to microscopists that the addition of a little *gum camphor* to the parafine-oil in the microscope lamps burning that fluid is a very great improvement. About fifteen grains of camphor, put into an ordinary-sized lamp, about one hour before using, will cause the lamp to give a far more intense and brilliantly white light than the parafine-oil alone would give. —*John A. Perry, Liverpool.*

ZOOLOGY.

Blind Fishes.—Is the *Typhlichthys* viviparous? Such would appear to be the case from the "important fact" alluded to on page 88.—*F. J. W., Winchester.*

New Lophoid Fish.—In the May number of the "Annals and Magazine of Natural History," Dr. Lütken describes a new Lophoid fish, under the name of *Oneirodes Eschrichtii*. It comes from high northern latitudes, off the coasts of Greenland, and from a great depth of water, probably abyssal. It is distinct, however, from an allied deep-sea Lophoid found near Madeira. The mouth is horizontal, and the whole fish is remarkably smooth and rounded. Its total length is only eight inches. It is very rare, and from this circumstance and the depth it comes from, very probably it has a long-extended antiquity, and its allies may be looked for among fossil forms.

Notes of a Cowcatcher Ride through Nebraska.—It was our good fortune to have a special train from the Platte river to Omaha, and as the novelty of riding in the cabin of the locomotive had long since worn off, the cowcatcher* was next resorted to, and with results that had not been anticipated. Sitting carelessly on the beam that supports the iron framework, "nursing one leg," I was suddenly struck in the face by a small object, that decidedly made an impression; others came in quick succession, and before I could solve the problem, a large grasshopper (*Œdipoda Haldemanni*, Scudd.) struck my boot, glanced and rolled into my lap. Having no bottle at hand, I immediately secured it in a leaf from a railroad land document that had been handed to me, and placed it in my pocket. By this time we were running at forty miles an hour, and grasshoppers pelted us like driving sleet. They seemed to fly or jump up

* A contrivance, as its name implies, for throwing off the line any cattle or other animals which may have strayed upon it; a very common case on those lines which are not fenced in, but simply laid across the extensive plains.—Ed. S.-G.

from the track at our approach, but not in sufficient time to get out of the way, and so we literally ran into them. Those that struck the engine were generally injured — in some cases completely smashed—and blown off at either side, and it was only those that happened to strike on our clothing that were worth preserving. Occasionally a stray dragon-fly or unlucky wasp would get in the way, and even tiger-beetles flew into the trap. Now and then a large wingless Brachypeplus, with its coarse spines, would make its presence felt. But all were fish that came to the net, and soon the leaves of my pamphlet were exhausted, all my pockets filled, and by the time the station was reached, I was only too glad to return to the car and bottle my treasures. In less than half an hour I took more insects than I had room for, and, what was still better, found two new species. We were much interested in watching the birds as they flew up before us. The majority of the flock would pass to one side or the other, but one or two would attempt to keep ahead of the engine, straining every muscle, till, finally, they would fall apparently exhausted, or be struck, and drop lifeless. One was captured alive by simply reaching out the hand and taking it. On all future trips through new country, I shall endeavour to get into the good graces of the conductor and engineer, and thus secure a place under the head-light; for, aside of its being a good "collecting-ground," one gets a splendid view of the country, without dust, without the usual jolting, and with a delightful breeze into the bargain, though it doesn't do to reflect too much on the possibility of shipping a cow or two.—*Charles R. Dodge, in "Canadian Entomologist," Jan.*, 1872.

Parasitic Rotifer (?)—I saw a little creature like that described in the May number of Science-Gossip as "a Parasitic Rotifer" adhering to the side of one of my water-observing bottles, where it remained some days. I thought at first it was a cypris, and have been much puzzled about it. It did not move about, but had a very rapid ciliary motion as it stuck to the glass. I mentioned it to our great naturalist here, and wished him to see it, but I could not detach it from the spot. I hope soon to observe some more, and then I shall call attention to them. I have before me now two large bottles of water, which a month ago were not over sweet, but full of *Hydra viridis* and the common Entomostraca; and now the water in both bottles is as sweet as possible and quite clear, through the agency of these minute creatures. How beneficial they must be in cleaning our ponds and ditches!—*Enquirer*.

Economy of the Larvæ of the Small Eggar (*E. lanestris*).—I have no doubt Mr. Barrett has hit upon the true cause, or rather the causes, why we do not succeed very well in rearing these in breeding-cages, or in-door contrivances:—firstly because they require sunshine, or plenty of air; and, secondly, because they need ample space to extend their nest as they increase in size. Double cocoons occur, amongst others, of the *Bombyces* and *Cuspidates*. I have seen them in the Puss (*D. vinula*); and the caterpillars of that species, if kept together in company, are rather fond of placing their cocoons upon the top of those formed by their brethren. In this case, the result is different from what occurs in the double cocoon. The one which is superimposed usually contains a living pupa, and the lower cocoon a dried-up pupa or larva, it having probably died from want of air.—*J. R. S. C.*

Irritating Effects of Caterpillars' Hairs (p. 22, Jan. No.).—I am inclined to think that "G. H. S." is quite correct in supposing that different persons are very differently affected by the urticating larvæ; but the reason is not so much any peculiarities in health of a transitory character, but arises from varieties of temperament. The mode of handling has also much to do with it, and, possibly, the state of the weather. I have often bred larvæ of *B. quercûs* to maturity, yet never experienced anything unpleasant. Others, however, besides "G. H. S.," have complained of such an occurrence, but the species is certainly not one, like *caja* and *auriflua*, under an evil repute for its urticating properties.—*J. R. S. C.*

BOTANY.

The best Method of Drying Plants so as to preserve their Colours.—The materials required are common cartridge-paper, thick white blotting-paper, cotton wadding and millboard, all cut to the same size. The plants should be gathered in dry weather, and soon after the flowers open, when their colours are brightest. Succulent plants (such as Daffodil, Orchis, or Stonecrop) should be put into scalding water, with the exception of *the flowers*, for a minute or two, then laid on a cloth to dry. Arrange the specimens and papers in the following order:—Millboard, cartridge-paper, wadding (split open, and the glazed side placed next to the cartridge-paper), blotting-paper; *the specimens* having small pieces of wadding placed within and around the flowers to draw off all the moisture as quickly as possible, blotting-paper, wadding as before, cartridge-paper, millboard. When the specimens, &c., are thus arranged, heavy weights should be put on them: about 30 lb. the first day, 60 lb. afterwards. Remove them from under pressure in a day or two; carefully take away all the papers, &c., *except the blotting-papers between which the specimens are placed;* put these in a warm air to dry, whilst the removed papers, &c., are dried in the sun, or by the fire. When dry (but not warm), place them in the same order as before; put all under the heavier pressure for a few days, when (if not succulent) they will be dry. Flowers of different colours require different treatment to preserve their colours. Blue flowers must be dried with heat, either under a case of hot sand before a fire, with a hot iron, or in a cool oven. Red flowers are injured by heat: they require to be washed with muriatic acid, diluted in spirits of wine, to fix their colour. One part of acid to three parts of spirit is about the proportion. The best brush with which to apply this mixture is the head of a thistle when in seed, as the acid destroys a hair-pencil, and injures whatever it touches (except glass or china); therefore it should be used with great care. Many yellow flowers turn green even after they have remained yellow some weeks; they must therefore be dried repeatedly before the fire, and again after they are mounted on paper, and kept in a dry place. Purple flowers require as much care, or they soon turn a light brown. White flowers will turn brown if handled or bruised before they are dried. Daisies, Pansies, and some other flowers, must not be removed from under pressure for two or three days, or the petals will curl up. As all dried plants (ferns excepted) are liable to be infested by minute insects, a small quantity of the poison, *corrosive sublimate*, dissolved in spirits of wine, should be added to the paste, which it will also preserve from mould. The best cement for fixing the specimens on to the paper or cardboard is *gum-paste*. It is composed of thick gum-water, and flour mixed in warm water, by adding the two together, warm, and of a consistency that will run off the hair-pencil.—*G. H.*

Erratum in Mr. Britten's Paper.—The lettering to fig. 65 (page 99) should read as follows:—Maple (*Acer campestre*), showing cotyledons and first and second pair of leaves. Drawn (as well as the two preceding figures) by Miss Giles, from specimens lent by Mr. O. A. Ferris.

The Shamrock of Ireland.—The Dutch clover, *Trifolium repens*, is, according to the authors of "Cybele Hibernica," "the plant still worn as 'shamrock' on St. Patrick's day (March 17), though *Medicago lupulina*, also one of the Leguminosæ, is likewise sold in Dublin as the Shamrock." Edward Llhwyd, the celebrated antiquary, writing in Dec., 1699, to Tancred Robinson, says, after a recent visit to Ireland, "their shamrug is our common clover." ("Phil. Trans.," No. 335.) Threlkeld, the earliest writer on the wild plants of Ireland, gives "Seamar-oge" (young trefoil) as the Gaelic name for *Trifolium pratense album*, and says expressly that this is the plant worn by the people in their hats on St. Patrick's day. Wade also gives Seamrog as equivalent to *T. repens*. The Wood Sorrel, *Oxalis acetosella* (the Gaelic name for which is Scalgan), a perennial plant, frequent on shady moist banks, and in damp places in woods and thickets, is also stated by other writers to be the true Shamrock, "Sham mar-oge" or "Shamrug." The delicate bright green trefoil leaves of this plant have a sensitive property, and close towards evening; they also possess an agreeable acid taste, and on that account are frequently used in salads on the Continent. It is, however, only the small trefoils, or clover, particularly the *T. repens* mentioned above, which are now generally used as an emblem on St. Patrick's day in Ireland; and more especially as at this period of the year the leaves of the Wood Sorrel have not usually appeared above ground; and even if it could be obtained, the clover which is pulled up with the root is a much more durable plant for the purpose, as it retains its freshness for some time.—*W.H.B.*

Plants in Hertfordshire.—It may be interesting to some botanists to know that a list of localities of plants growing in Herts has just been published by the Rev. R. H. Webb. It shows a considerable increase in discoveries of localities of new plants.—*T. B. Blow.*

GEOLOGY.

Graptolites.—Professor Allman has a splendid paper on the natural history position of these peculiar zoophytes, in the "Annals and Magazine of Natural History" for May. He regards the serrated and other projections which characterize them, as representing the "nematophores" in such living genera of Hydroida as *Antennularia*.

A Huge Pterodactyle.—A new species of this extinct flying reptile has been found in the cretaceous deposits of America, which must have measured across the tips of the wings at least twenty-five feet.

Eye-stones.—The bound volume of Science-Gossip for 1871 has just come to hand; and in looking over the "Notes and Queries" columns, I observe quite a number of communications on "*Eye-stones.*" I must confess I was surprised *not* to find in the entire volume a correct account of what they really are. These "eyestones" are found in the head of several species of *Astacus Bartonii*, or "*crawfish*," as they are familiarly called here. When a mere lad, myself and playmates invariably carried several of these stones in our vest pockets for the purpose of removing particles of dirt or other small substances which might get into *our* eyes. We obtained *fresh* ones by catching the crawfish, opening the head, and removing the "stones" from there; *old* ones were found among the coarse sands left exposed by the lowering of the water in the streams. I once had about fifty of them; my father requested me to place them in a tea-saucer, and having done so, my mother poured several spoonfuls of strong vinegar over them, when these stones apparently suddenly became possessed of *legs*, and went "*crawling*" around in every direction. —*John H. Klippart, Ohio State Agricultural Geologist.*

NOTES AND QUERIES.

The Queen of Spain Fritillary (*A. lathonia*). —This butterfly is so exceedingly rare in the British islands that little is known of its habits here, and the brief account given by Mr. Booth of its capture in Jersey has its value, especially as he notes that the species occurred in lucern-fields. Its occasional occurrence by solitary individuals only, in Kent, Suffolk, and various places on or near the coast, has seemed a remarkable thing, since we find that its brethren of the same family, when they do appear, are generally in parties, the fritillaries being fond of "assembling." All, or almost all, the specimens which have been thus taken have been on the wing in autumn, when I presume the Jersey insects were also taken, yet on the continent of Europe it is undoubtedly double-brooded. Any further particulars which Mr. Booth may have to communicate about the "Queen of Spain," as observed by him, would be very acceptable, I am sure, to the readers of the *Entomologist* or Science-Gossip.—*J. R. S. C.*

Gold-fish.—Buckland, in his "Curiosities of Natural History," says, "One cause why these fish do not increase, is that they devour each other. The spawn is eaten, and the young fish also, by their comrades. To keep up my stock I have been obliged to take out the spawn, and keep the young fish during the first few months of their lives in separate vessels."—*C. Walrond.*

Bird-fly.—An ornithomya abounds on the short-horned owl, the well-known species often met with by sportsmen in broad daylight. We have not seen it mentioned that a species of bird-fly is common on the short-horned owl.—*R. G.*

Balaniform Oak-galls.—I inclose a twig from an oak which is covered with such galls, looking a good deal like barnacles. They are probably the work of a species of Cynips, perhaps *C. Sieboldii*, recorded as new to England in the last number of the *Entomologist's Annual*. The insects are all flown.—*R.G.*

The Dodder (*Cuscuta*).—I found this plant in our county of Stafford for the first time in 1870, growing on red clover. Last year there was no clover in the field, but the plant appeared on some vetches; consequently it must have increased by shedding its seed, and the young plant must at first have lived an independent life. I presume the species is *C. trifolii*, Bab.—*R. G.*

Stag Beetle.—Both the male and female stag beetle will bite when *sufficiently* irritated. The female will often do so, but the male not so frequently. Some years ago I had brought to me a very fine male, *L. cervus*, which had been caught on the pavement in Holborn. I found it difficult to kill. (I used then to place a little carbonate of ammonia in a small box, and insert the insect, when it would as a rule quietly die.) After being in the box some minutes and the insect not showing any signs of dying, I took it out with my fingers, and immediately experienced a *severe* bite. The insect bit me so severely as to make me wince. Although the great length of the (male) mandibles would seem to tell against their power to bite, still the insect can exert sufficient force to deter any one from trying a second time.—*H. B. S.*

Otter.—On the 3rd of April a full-grown female otter was captured at Styal, Cheshire. It was caught in a trap which had been set for rats, and was only held by two toes of its left hind foot. It crossed the Bollin with the trap on its foot, and tried to conceal itself in a rabbit-burrow, but the chain of the trap having got entangled in a bush, prevented the otter from getting more than half its body underground. Another otter was caught near the same place on the 13th February, 1870.—*G.H.H.*

Scarcity of Moths, &c.—Your correspondent "J. R. S. C." seems to me to draw unnecessarily upon his imagination in trying to account for the alleged scarcity of moths and butterflies after a damp winter. Even the fact requires to be substantiated, since the years of greatest scarcity of these insects have been those which followed a wet *summer* rather than a wet winter. Unquestionably a superabundance of rain is exceedingly destructive to *larvæ* both in summer and winter, and probably also to pupæ, which are exposed to it; but the great majority of pupæ are protected by a silken or earthen cocoon, or placed in a sheltered position, and it remains to be proved that moisture can, in their natural retreats, get at them to any serious extent. "J. R. S. C." seems to overlook the facts that in mild winters the ground is open to the careful investigation of birds; that predaceous beetles and their larvæ are lively and require food; that those formidable foes to pupæ of all kinds, the earwigs, are also able to carry on their destructive researches at a time when there are but few flowers to serve them as food; and worse than all, that mice are able to search out their favourite tit-bits at the roots of trees, the sides of palings, on hedge banks, and elsewhere; so that, without the assistance of damp and mould, there is abundant reason for any scarcity of perfect insects. Of hybernating larvæ the very large majority feed upon low plants which are always to be obtained; how then can the larvæ be tempted forth by the mildness of the weather, and killed by starvation? And in the case of the few species which pass the winter in the egg state, it is hardly necessary to remind "J. R. S. C." that the same amount of warmth which hatches the eggs provides the food upon which the larvæ feed, while in those cases in which the eggs naturally hatch before the opening of the leaves, the catkins of some trees, and the bark of the young shoots of others, serve the young larvæ for food until the leaves appear.—*C.G.B.*

Shore Wainscot (*L. littoralis*).—I have much pleasure in announcing this district as a new locality for Littoralis. I believe it is only known in three other places at present; viz., Isle of Wight, New Brighton in Cheshire, and Lytham in Lancashire. From the nature of the coast I thought that Littoralis ought to be here, and that it only wanted looking for to find it. After searching for three days, I found a larva dead on the sand, evidently dropped by some bird. I then set to work with redoubled energy; I soon found two more, and I now possess seventeen good lively specimens, and have good hopes of obtaining more as my eye gets practised in finding them.—*A. C. Hervey, Pokesdown, Ringwood.*

Canine Gyrations.—I have been much amused when perusing the scientific disquisitions on my habit of turning round, head foremost, several times previous to my lying down to sleep. Be assured, Mr. Editor, there is no need of any learned lucubrations concerning my so-called "gyrations." If man were covered with thick hair from head to toe, he too would make similar turnings, in order that he might lie down in comfort with his outer envelope smoothly packed beneath him. As regards his hair-protected head, man does act on a similar plan when about to rest it on a pillow, or to place it in a nightcap, though from length of habit, he is, perhaps, unconscious of the practice; but, depend upon it, he would find himself sadly discomforted were he to lie down with his hair "against the grain;" and, without assuming any great amount of science, I may venture to claim from my illustrious biped friend permission to continue an obvious and simple means of comfort to myself as a hair-covered quadruped.—*Fido.*

Habits of Spiders.—In the earlier numbers of Science-Gossip, it was, I consider, very clearly proved that under certain conditions the geometric spider will devour its own web. I do not think, however, that it has ever been observed that the web of the house spider serves for its provision during the winter months. I may preface my remarks by stating that for some time past I have been in the habit of keeping spiders in confinement, in order to watch their habits; and among others, I procured, at the latter end of last summer, a very large and hairy-legged black spider (*Tegenaria*, sp.) in an outhouse near London. I obtained also, at the same time, a still larger spider, the finest I have ever seen in this country, which lived in confinement only about six weeks. Its first or front pair of legs were much longer than the others, and measured exactly $4\frac{1}{10}$ in. from claw to claw. I should be glad to learn its name, and whether it is not, as has occurred to me from their similarity in many respects, the male or female of the still living species of spider, which has a larger body and shorter, but equally hairy, legs. These spiders seem to care only for the common little brown housefly, and will not, however hungry, touch a blue-bottle. The number of flies sucked dry by the surviving spider previous to the end of last year was most astonishing; and the more flies it consumed the more web it spun, in layers one over the other, as close in texture almost as tissue-paper. But the winter came, the flies disappeared, and I expected my spider would hybernate or become torpid; no such thing, however, happened, and in midwinter it seemed just as active as ever. I then noticed some curious holes in the web, which looked as if it had been cut away with some sharp instrument, and it kept on going and going, until altogether about six or seven superficial inches of this paper-like web had been devoured. But the spider did not thrive on this food, and became very thin. Now I can again procure him flies, and he is getting plump. Contrary to the observations of some of your previous correspondents, this spider is very readily cheated, and has now become so tame that he runs out to be fed, whenever I open the jar in which he is confined, to give him a fly. He used formerly to retire to the recesses of his cell on such occasions. This spider is, as most of his tribe, nocturnal in his habits, and feeds chiefly at night. I estimate the extreme spread of his longest legs to be about three inches. I should be glad to learn his specific name, and to know whether he is usually a house spider; he was originally dislodged from behind a gas-meter. How many different kinds of spiders are known as house spiders? I have certainly come across two, if not three.—*Gilbert R. Redgrave.*

The Winter Food of Wood-Pigeons.—In answer to your correspondent's query on this subject, I send a few observations of my own. Having had a great deal of pigeon-shooting on a farm between Guildford and Woking, where during the winter months there is generally a flock of several thousands, which roost in the fir plantations near, I find as a rule that they have been feeding on acorns and clover, acorns especially as long as they can get them; but if not looked after well, they will very soon destroy a field of young clover, which they are very fond of. During harvest they are very destructive in the pea-field, but I have not noticed their feeding on other kinds of corn.—*J. L. C.*

Plantain-leaved Leopard's Bane (*Doronicum plantagineum*).—This is, I believe, considered a rare plant, found only in a few places in England. It may not be uninteresting to some of the readers of Science-Gossip to know that I have found it growing at Astley, near Stourport. The plant is now in full bloom.—*Thomas Wedley.*

Do Birds eat the Shells of their Eggs or not?—We have watched our canaries hatching their eggs, and have never found any shells about the cage. The same with hedge-sparrows, &c., in the garden. Mrs. Howitt, in her paper "Birds and their Nests," in the *Family Friend*, seems to think that birds carry their eggs away to prevent the nest being discovered. Can any of your readers solve this question?—*F. M. M.*

Starlings.—A lady contributor to Science-Gossip, Miss Barbara Wallace Fyfe, in whom I am pleased to recognize an old friend, and whose talented father first introduced me to Science-Gossip, must, I am sure, mean, when she says that starlings are, like swallows, migratory birds, that they partially migrate from one English county to another,—not that they, like swallows, quit these shores. I know from personal observation that they winter in Hants, Dorset, and also in this part (Anglesea) of North Wales. They assemble in large flocks, and invariably, if there are rooks in the vicinity, accompany these birds.—*Mrs. Alfred Watney.*

A scientific education is one of the needs of the time. Science is transforming the world and revolutionizing opinion. The leaders of thought are trained in the laboratories rather than educated in the schools. As a means of mental discipline, scientific study is fast establishing itself on a level with the "humanities" of olden time as a teacher of patience; of the humility that sits at Nature's feet and learns her ways; of the intellectual thoroughness which gathers all the facts before it generalizes, Science has no equal. Its spirit, if not always that of its professors, is teachableness; its method, if not invariably their temper, is humility; its instrument is reason emancipated from passion; and the tendency of its study is to lift men out of the region of instinct and impulse into that of reason. As an exclusive culture it would doubtless be onesided; it is, however, as a counterpoise to an existing onesidedness that we need to have it adopted in all our schools.—*Daily News.*

Sugaring for Noctuæ.—The original and best mixture for this purpose is 1 lb. of *strong foots* sugar, a tablespoonful of gin or rum to half a pint of porter or ale. The success greatly depends on the quality of the sugar and temperature of the night: when the latter is warm, moist, and with a moderate wind, failure seldom occurs from June to November: prior to June the bait is of little use. Do not be discouraged. I remember once sugaring in the Isle of Wight for a fortnight at the same place: the first week I think hardly a dozen moths appeared; the second week as many thousands. The proper way to apply the sugar is with a moderately large painter's brush. Make one or two stripes on the tree, say a foot long. If economy is desired, saturate some pieces of coarse calico, about 4 or 5 inches square, with the mixture, and dispose the squares wherever you please, gathering them up again on your last round. With the addition of a very little more syrup, these will last many months and be a great saving in sugar. This plan is especially applicable on the coast and other places where there are no trees. On the sand-hills at Deal, which is a place of this description, the practice used to be to tie up the long grass in knots, and sugar on them. I have seen four or five collectors there at one time, each of whom had his particular route, having tied his knots in daylight.—*An Old Entomologist.*

Gryllus viridissimus.—This grasshopper I have taken not uncommonly when sugaring for moths: they sucked the syrup greedily—probably they might thrive on sweets in captivity.—*An Old Entomologist.*

Scottish Natural History.—I should feel much obliged if you, or any of the readers of Science-Gossip, could inform me of any work on Scottish Natural History and Scottish Lepidoptera; or on the Natural History and Lepidoptera of Edinburgh, or of the South of Scotland.—*G. Ford.*

Saffron.—Somebody has observed that "the deeper the well of knowledge that the rill of popular information flows out of, the better." I fear the well pertaining to Helen E. Watney is not of a fathomless character, or she could not have penned the last paragraph in her article in the last number of Science-Gossip (see p. 108). She says, "The Meadow-saffron is a different plant; from it *colchicum* is produced." What is colchicum? And she further adds, "that it possesses no medicinal virtues, she believes." Now it so happens that *saffron*, the dried style and stigma of the *Crocus sativus*, is held in very little esteem as a medicine at the present day, being chiefly employed as a colouring and flavouring material; whereas the Meadow-saffron (*Colchicum autumnale*) has been held in great repute from a very remote period; and preparations from the bulb and seed are daily prescribed by medical men, and kept in every chemist's shop in the kingdom.—*H. B.*

Saffron and Meadow-Saffron.—Your talented correspondent Mrs. Watney, in giving some details of the growth of saffron in last month's Gossip, describes the plant as flowering a week or two after the appearance of the leaves. I have hitherto believed the reverse to be the order of progression, and I find my text-books tell the student that the leaves "appear just as the flowers begin to fade." This is perplexing to one unable to set doubts at rest by personal observation of the plant. Although saffron may still, as Mrs. Watney states, be a favourite remedy for nervousness with old women on account of its slightly stimulant action, it is no longer of importance as a medicine in this country, if we except its administration to our feathered pets when moulting,—a common practice; whether beneficial or otherwise I know not. It is now chiefly employed as a colouring agent, the deep orange tint which it readily imparts either to water or spirit, rendering it of considerable use in the arts for colouring toilet soaps, lozenges, &c. I should like, if you will permit me, to say a few words on Meadow-saffron (*Colchicum autumnale*, Linn.). Mrs. Watney says she believes that neither colchicum nor the "early purple crocus—the *C. vernus* or spring crocus" (? *Scilla verna*, Huds.—I believe we have no indigenous crocus) possesses any medicinal virtue. This, however, is so far from being the case with the colchicum, that it may be advisable to sketch its properties and medicinal uses, and thus nip error in the bud. This plant belongs to an almost universally poisonous order (*Melanthaceæ*), and is itself no exception to the rule. Both the corn and seeds contain an alkaloid (*Colchicia*), which is a powerful poison. In small doses repeated, colchicum is largely used in medicine to relieve the pain of gout and rheumatism, and is the active ingredient in several celebrated nostrums for the cure of gout. Colchicum seeds are remarkable for their hardness, as those who have pulverized them with pestle and mortar will doubtless remember.—*J. W. White.*

Sugaring for Noctuæ.—In answer to Mr. Elliott's question "how to make the best mixture for sugaring for noctuæ," I may state, that for some time past I have been accustomed to use a compound made of the undermentioned ingredients, which has proved most efficacious; viz., ½lb. of moist sugar, ½ lb. of black treacle, and about a glassful of "porter" (beer). These should be allowed to simmer until reduced to nearly the same consistency as treacle, and before being used should have half a wineglassful of rum added.—*H. A. Auld.*

Does Gaslight kill Plants?—Gas is most assuredly injurious to the growth of plants, and even to the preservation of cut flowers. I am very fond of both, and always have a large supply in my rooms, where I burn a great deal of gas. I find that the heat and smoke from the gas have a very deleterious effect on growing plants. They flag and droop, having a scorched, withered look. The only way in which I can keep them at all fresh is by constantly using a sponge and *lukewarm* water; first syringing them well and then sponging the leaves. After this operation it is wonderful how refreshed the plants look. When they show signs of drooping very much, I remove them to a room where there is no gas used, for a week or two, and the change of air seems to restore them; but to keep plants in a room where there is much gas burnt constantly is simply a matter of impossibility.

They require a great deal of extra attention to preserve them for even a time, and unless given a change of air, very speedily droop and die. Cut flowers in water are almost worse to preserve, the water becomes heated and causes the stems to decay rapidly: so, to make them last for a few days, it is necessary to change the water before leaving them at night, and I find a very good plan is to put them in a dark cellar till morning. Gas stoves are considered very injurious in hothouses; in fact, if they are used, they are generally placed outside the hothouses, and hot-air or water-pipes introduced.—*Barbara Wallace Fyfe.*

How to Stock a Pond.—I know that the Hon. Grantley F. Berkeley, of Alderney Manor, Poole, Dorset, had a new river made in his estate and stocked it with fish from ova. I saw some of the beds prepared for trout ova, and they came on beautifully and most successfully. I dare say if "F. C." will write to Mr. Berkeley, he will give him the information he requires.—*Barbara Wallace Fyfe.*

Sea-Eagles.—It is most probable that the eagles killed in Somersetshire were immature Sea-Eagles.—*G.*

Supposed Parasite of Elm.—The parasite on Elm figured in the last number of Science-Gossip is the common Dog-tick (*Ixodes vicinus*), which is found in all sorts of unusual situations; in fact, anywhere, and only attaches itself to the dog when it happens to meet with one. I have frequently found it among grass in sweeping for small diptera.—*E. Capron, M.D.*

Local Floras.—Referring to a suggestion in Science-Gossip (page 163, July, 1871), concerning Local Floras, I would advise botanists, entomologists, geologists, and "ists" in general, who contemplate a visit to the Isle of Wight, to procure Venables's guide, published by Stanford, Charing Cross (price, I think, 6*s.*). I may safely affirm that he who has once made this book his companion when on the island will not be likely to repeat his visit without it. Allow me to suggest that naturalists, when they visit any locality and come across any really useful guide to the botany, &c., of the place, should let the same be known for the benefit of brother naturalists.—*H. R. Warrington.*

South London Entomological Society, 26 and 28, Newington Causeway, S.E.—Meetings held on Wednesdays at 8 p.m. Objects—formation of a library and diffusion of entomological science by means of papers and exhibitions. Subscription, 6*d.* per month. New members are invited.—Treasurer (*pro tem.*), Mr. J. G. Marsh, 842, Old Kent Road. Hon. Secretary, to whom all communications should be addressed, Mr. J. P. Barrett, 33, Radnor Street, Peckham, S.E.

Endromis versicolor (page 115).—In answer to Mr. Gascoyne, I beg to inform him that the statement as to this species being a web-weaver was made not from my own experience—which would incline me to Mr. Gascoyne's way of thinking,—but from an observation of Newman, who informs us, at page 47 of "British Moths," that "the caterpillars come out about the 1st of May. At first they are gregarious, *spinning a web* over the twig, and attaching themselves by their claspers." In my own collecting experience I have only once been able to obtain the larvæ, and then, like Mr. Gascoyne, did not observe any attempt at web-weaving. I imagined at the time that this arose from my having reared them from the egg, and the consequent cessation of a necessity for external defence. —*Charles Lovekin.*

Shamrock.—An Irish lady tells me that "the true Shamrock is the *Trifolium repens*, and shamrock is the *Irish* name for this plant." I always thought the *Trifolium repens* was the clover known generally as "Dutch clover," and this lady's definition of the Shamrock confirms it: for an Irish gentleman brought me, last summer, a root of *the* Shamrock, and I exclaimed on seeing it, "How like the Dutch clover we used to sow on the upper fields at home." The Arabic for trefoil, strange to say, is *Shamrakh*, and the same plant was held sacred by the Persians in Iran, as emblematical of their Triads. Then, again, readers of Pliny's works will remember that he says "serpents are never seen on trefoil, and it prevails against the stings of snakes and scorpions." There seems somewhat of a coincidence between this and St. Patrick's miracle of the reptiles; but, alas! for Pliny's veracity, I saw a snake last year on some trefoil.—*H. E. Watney.*

The True Shamrock (p. 113).—The etymology of this word is clearly from the native Irish, viz.: *seamrog, i.e.*, trefoil, the three-leaved wild clover. The prefix *seam* is to all intents and purposes our word "charm," phonetically altered. The "s" has the power of "sh," and the word is allied to *seun*, "an amulet;" *cf.* the Welsh *swyn*, "magic." *Trifolium repens*, known as white or Dutch clover, is the native Shamrock of Ireland; although some, mistakenly, claim the name for *Oxalis acetosella*, the common Wood Sorrel; but that in Irish is *seamsog*. It is usual now to show fancy or cultivated trefoils as the true Shamrock; but it could scarcely have been so in St. Patrick's day. The real poetical charm, however, clings to the four-leaved Shamrock. —*A. H.*

Are Plants injured by Gas and Gaslight?—The presence of gas in a room would most certainly be very injurious to the well-doing of plants grown in that room. Plants, like human beings, require a season of rest. They sleep in the dark; therefore to keep them constantly under the influence of light would weaken them, and eventually destroy them. In this way gaslight kills them. There is, we all know, a very close resemblance in the functions of animals and leaves. The air inhaled by animals proceeds to the lungs, and acts on the blood. The air inhaled by plants, through their foilage, acts upon the sap. Oxygen and carbonic acid gas combined form the air essential to the health of plants, and as we in sleep exhale less carbonic acid than in our waking hours, plants give out a diminished quantity of oxygen during the night; but an over-amount of carbonic acid in the air will destroy plants. It is a singular fact that nearly every flower requires a particular degree of light for its full expansion. I have been trying some experiments during this last year with respect to the effect of light on plants, but have only proved what was well known before; still the *chemistry of botany* is a most interesting study, and I wish some of the readers of Science-Gossip would kindly recommend me a good work on it.—*Helen E. Watney.*

Phosphorescence.—What is the correct explanation of the luminosity of two pieces of loaf-sugar rubbed together in the dark? Is it electric or phosphoric light?—*R. H. Nisbett Browne.*

Gold-tail Moth.—In Mr. Lovekin's "Notes on the Web-weaving Caterpillars," on p. 58 (or 85 in my copy), he includes in his list the Gold-tail, a species which I never knew to be a web-weaver at all, if we except the tiny web (or rather cocoon) in which the young caterpillar hybernates during the winter. His remarks would seem to apply to the social tent-weaving caterpillars, the habits of which are not shared by the Gold-tail caterpillar. In this neighbourhood the caterpillar of the Gold-tail is seldom or never found on the Blackthorn, but feeds in great profusion on the Hawthorn, and also on the Elm.—*W. H. Warner, Kingston, Abingdon.*

Curious Habits of Swallows.—I can confirm "G. E. R.'s" remarks under the above heading in so far as to prove the repugnance exhibited by the Swallow tribe to the birds of prey, having on two or three occasions seen a flock of Hirundines chasing small hawks; but with this difference, that the pursuers were not swallows but sand-martins (*Hirundo riparia*). In addition to the anecdotes related by "G. E. R.," as to the pugnacity of the Swallow, I will mention another which proves the Swallow to be an intelligent bird, and also occasionally actuated by a revengeful spirit. A gentleman when out shooting one day brought to the ground a hen swallow which was skimming in the air in company with her mate. The latter at once dashed at the gentleman, struck him in the face with its wing, and continued pertinaciously to annoy him for a long time. For weeks did the revengeful little bird maintain "war to the knife" with the murderer of his gentle partner, attacking him whenever an opportunity offered. On Sundays it failed to recognize the gentleman in his change of dress, and let him pass unmolested. This anecdote has been well attested.—*W. H. Warner, Kingston, Abingdon.*

Variety of the Tufted Duck.—I procured a variety of this duck about the end of April, 1869. The crest was a deep crimson, the head fading into deep black towards the neck, and then beginning to be streaked with silver, and gradually merging into a broad white band immediately above the chest. The silver streakings and black then began again, and continued down the back. The breast was marked with one ring of black, and was pure white all the way down from that. The legs and feet were flesh-colour; the iris was orange-yellow. I carefully observed all the specimens in the British Museum of *Fuligula cristata*, but they were all more or less buff-coloured. The reason for the peculiarity was, I think, the duck's beginning to put on summer plumage.—*G. E. R.*

Lesser Pettychap.—The Lesser Pettychap, it may not be generally known, is the same as the Chiff-chaff; the correct Latin name of which is not *Sylvia hippolais*, but *S. rufa.*—*G.*

The Saffron again.—At page 281, vol. vii., of Science-Gossip, "J. F. C." inquires what plant Mr. Walter Thornbury, in describing the town of Saffron Walden, refers to, as "a plant resembling a thistle, yet without down," &c. The plant is the *Carthamus tinctorius*, Lin.,—Bastard Saffron, or Safflower, an annual of the Composite family, and a native of Egypt, having sharp-pointed, oval, sessile, spiny leaves. The flowers grow in bracts inclosed in a roundish spiny involucre; the florets are of an orange-colour, turning red as they dry. The dried flowers are exported in large quantities from Egypt and the Levant; are used for dyeing, and also to adulterate the true saffron. I cannot think that this has ever been cultivated in England for commercial purposes, as it is a *half-hardy* annual. The true saffron is the dried stigmas of the *Crocus sativus*, and was first cultivated at Saffron Walden somewhere about the time of Edward III., from which circumstance the town has derived its name. —*Josh. B. Bodman.*

A Shower of Frogs.—I really thought, until I read "M. A. B.'s" inquiry in the January part of Science-Gossip, that showers of frogs, like showers of gold, were exploded myths. Doubtless the latter fable had its moral, and we occasionally see an elderly "Zeus" of modern times win a fair young "Danaë;" but I do not believe the former either serves to "point a moral or adorn a tale," unless it be a fairy one. I will, however, briefly relate to "M. A. B." what a very good naturalist friend of mine said to me in explanation of this very subject, apropos of a newspaper account of "a shower of frogs." Every female frog is capable of producing 1,000 young ones; these little froggies hide in crevices and under stones, waiting to come forth directly the first summer showers pour down. They appear in multitudes immediately genial rain falls, and some good folks, ever since the days of Aristotle, have been found to imagine that they drop from the clouds, or that they have been taken up from a marsh by a whirlwind, and let fall. In the case of fish it is different, seeing that they are never said to grow on trees, or on land, save in comic song-books. A whirlwind is the cause of their sudden descent from an element they are not supposed to inhabit,—the air, to another region equally unsuitable,—the earth. Some curious facts are recorded in the "Proceedings of the American Academy of Science" with respect to frogs. You have so many American contributors to your pages, that I look with interest to replies from them on the subject of frog showers.—*H. E. Watney.*

Abnormal Cherries.—There is a Morella cherry-tree against a north wall in our garden, which for two years past has borne numbers of double, triple, quadruple, and *one* quintuple cherry. The occurrence of these forms in 1870 led me to examine the flowers in 1871, and from a superficial observation I found that to each flower there were from four to ten pistils and as many ovaries, some proving abortive and some fruitful. It was in the summer of 1871 that the quintuple specimen occurred.—*P. P.*

The White Ermine (*Arctia lubricipeda*).—People don't usually trouble themselves much about the meaning of Latin names, yet some may have speculated as to the reason why the above-named was called "slippery-footed." It might have arisen from the fact that the moth, when taken up or touched, at once loses its foot-hold, and feigns death, and therefore seems as if it had an insecure or slippery hold of whatever substance it is reposing upon. But I am rather inclined to think that the habits of the caterpillar originated the names; for it has two very distinct modes of progression. Under ordinary circumstances it crawls along rather languidly, but should it be alarmed, or suddenly roused, it moves with a degree of velocity which is really astonishing, though this is not kept up for any length of time; hence it may have received the appellation *lubricipeda*, because at certain moments the caterpillar can slide or glide along as if it were passing over a slippery or lubricated surface.—*J. R. S. C.*

NOTICES TO CORRESPONDENTS.

All communications relative to advertisements, post-office orders, and orders for the supply of this Journal, should be addressed to the Publisher. All contributions, books, and pamphlets for the Editor should be sent to 192, Piccadilly, London, W. To avoid disappointment, contributions should not be received later than the 15th of each month. *No notice whatever can be taken of communications which do not contain the name and address of the writer*, not necessarily for publication, if desired to be withheld. We do not undertake to answer any queries not specially connected with Natural History, in accordance with our acceptance of that term; nor can we answer queries which might be solved by the correspondent by an appeal to any elementary book on the subject.

Gregory.—It is not our custom to particularize any individual dealer or tradesman to the disadvantage of the rest.

E. I.—Our experience of Gum Dammar leads us to give the preference to Canada balsam for mounting Diatomaceæ; we find that the striæ are less easily resolved when the gum is used; for vegetable and insect preparations it answers very well, but is not more easily manipulated than Canada balsam.

J. M. W.—The small black spots on the raw American cotton are the spore-cases of *Chætomium*, a genus of microscopic fungi. See page 175 of Cooke's "Microscopic Fungi" (Hardwicke, London) for further detailed account.

Mosses.—1. *Hypnum serpens*; 2. *Homalia trichomanoides*; 3. *Anomodon viticulosus*; 4. *Leucobryum glaucum*.—*R. B.*

A New Subscriber.—The supposed new species of beetle is a common weevil (*Otiorhynchus sulcatus*, Fab.), a species well known to make havoc among all kinds of plants. We would suggest to our correspondent that beetles do not grow in the perfect state, and that the *elytra* are not "pseudo-wing-cases." See Science-Gossip, vol. for 1870.

R. H. L.—Your query had been mislaid. The parcel sent contained a moss, a species of *Hypnum*, which is very sensitive to moisture. It is common at the base of old trees.

G. B.—The egg-cases and eggs are those of the common Dog-fish, which may be distinguished from those of the Skate by the longer tendrils of the four ends.

E. M. P.—The specimen sent is *Claytonia perfoliata*, an American plant which has domesticated itself in this country. It is sometimes eaten as a salad.

T. W.—We cannot undertake to name specimens of the nature of those sent. They were the midribs of the fronds of some Rhodosperm sea-weeds. That is all we know.

H. B. T.—We know of no other plan for preparing chalk for microscopic examination than that usually adopted; viz., rubbing the lump of chalk down with a toothbrush in a cup of water, and when a sufficient quantity is obtained, pouring it into a test-tube or a two-ounce phial, and shaking it well, and decanting all that does not subside in the course of two minutes, repeating the process as long as the water continues cloudy. The deposit remaining in the test-tube may then be boiled in some liquor potassæ and again well washed. If the chalk is hard and does not readily yield to the brush, a lump of it may be boiled in a weak solution of glauber salt and then carefully washed. The organisms in the chalk generally require to be mounted in Canada balsam.

EXCHANGES.

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

Leaf of *Onosma tauricum* with peculiar stellate hairs (mounted), in exchange for other well-mounted objects.—J. Sargent, Jun., Fritchley, near Derby.

Section of Porcupine's Quill (mounted), for any good microscopic object well mounted and of interest.—J. M. Hoare, The Hill, Hampstead.

Cardium Norvegicum, *Pectunculus glycimeris*, &c., for other British marine shells.—A. W. Langdon, Llanrwst House, Hastings.

A liberal allowance in Diatoms (selected and arranged in groups), for *Hyalonema mirabilis*, Wheel-plates of Chirodota, or Anchors of Synapta.—G. Moore, Dereham Road, Norwich.

Eggs of the Puss Moth in exchange for others.—G. A. Birkenhead, Post-office, Sale, near Manchester.

Griphites, Rhynconella, and Corals, in exchange for other fossils.—H. Richards, 10, Ellingboro' Crescent, Weston-super-Mare.

For Reproductive Organs of Moss (*Bryum hornum*), send stamped directed envelope to J. H. Martin, 86, Week Street, Maidstone.

Carefully mounted slides of *Glance Erde*, or cuttle-fish shell, for polariscope, offered for mounted palates of mollusks or other slides.—A. B. C., Belmont, Dartmouth.

A few British Birds' Skins and Sternums of Eagle Owl, Long-eared do., Goshawk, Glaucous Gull, and Lesser Black-backed Gull, for birds' eggs, or Lepidoptera in any stage.—S. L. Mosley, Almondbury Bank, Huddersfield.

Spicules from *Doris tuberculata* mounted, for other mounted objects.—John C. Hutcheson, 3, Lansdowne Crescent, Glasgow.

Wanted, Animal Parasites (mounted), correctly named. Entomological slides offered in exchange. — Address, E. Lovett, Holly Mount, Croydon.

Lepisma saccharina.—Send stamped envelope.—S. C. Hincks, Runfold Lodge, Farnham, Surrey.

Mounted Microscopic objects in exchange for other mounted objects.—T. W. Cowan, Horsham.

Small, but fair, specimens of *Parnassia palustris*, *Sibthorpia europæa*, *Hymenophyllum Tunbridgense*, &c., for other of the rarer British plants.—Mrs. A. Allen, Barcombe Rectory, Lewes.

Microscopic objects (mounted) in exchange for other objects.—T. W. Cowan, Horsham.

Siftings of Sponge Sand, for object and stamped envelope.—H. R. Warrington, 9, St. George's Terrace, Barnsbury.

Wanted, Fish Remains from the Coal Measures, for Wenlock and Woolhope *Brachiopoda*.—Apply, sending lists, to the Rev. W. H. Painter, 2, Belgrave Street, Derby.

Roots of *Ophioglossum* for roots of *Botrychium Lunaria*.—Miss Ida Rawlins, Gwastad Hall, Wrexham, North Wales.

Three single-lined *Gorgonias*, attached to valve of *Tellina*, for three inches of Glass-rope sponge.—R. J. Nelson, Stoke, Devonport.

Eggs of Water and Land Birds offered for larvæ or eggs of *E. versicolora*.—Mrs. Battersby, Cromlyn, Rathowen, West Meath, Ireland.

Larvæ and Pupæ of *B. Quercus* and Caja, eggs of *S. Populi*, for larvæ or pupæ of *Villica*, *C. Dominula*, &c.—R. Garfit, Market Square, Alford, Lincolnshire.

Æcidium Ari offered in exchange for equally rare fungi, good botanical or polariscope objects.—Henry Pocklington, 12, Margaret Street, Hull.

BOOKS RECEIVED.

"Corals and Coral Islands." By James D. Dana, LL.D., Professor of Geology and Mineralogy in Yale College, &c. London: Sampson Low & Co. 1872.

"Botany for Beginners." By Maxwell T. Masters, M.D., F.R.S. London: Bradbury, Evans, & Co. 1872.

"May Flowers." By the Rev. James Harris, M.A., Head Master of Cathedral Grammar School, Chester. London: Griffith & Farran. 1872.

"The Journal of Botany." May.

"The Canadian Naturalist and Quarterly Journal of Science." No. 3.

"The American Naturalist." No. 4.

"The Canadian Entomologist." No. 4, April.

"The Lens." Part II.

"Report of Geological Survey of Ohio." 1870.

"Fourth Annual Report of Noxious, Beneficial, and other Insects of the State of Missouri."

"Fruit Trees," from the French of Du Breuil. London Lockwood & Co.

Communications Received.—A. C. H.—F. K.—G. M.—C. R.—A. W. L.—J. S.—J. H.—H. R.—H. B. S.—Z. E. G.—H. E. W.—T. S.—R. J. K.—G. A. B.—C. J.—W. A.—J. C. H.—C. G. B.—A. H.—W. H. B.—F. K.—J. H.—R. L.—R. H.—R. W.—H. E. B.—J. S.—F. B. B.—C. L. W.—R. H. A.—W. S. G.—E. W.—R. H. A.—R. G.—H. P.—H. E. F.—H. B. T.—J. S.—M. A. D.—A. P. J.—C. A. R.—C. C. A.—J. H. C.—J. T.—J. R. D.—J. A.—L. T.—J. R. S. C.—W. E.—H. F. P.—C. S.—G. H. H.—C. J. W. R.—J. G.—W. K.—A. G. G.—J. B.—G. O. H.—S. B.—W. H. P.—J. Le B.—W. B.—J. G.—C. R. E.—C. L.—J. F.—J. A. P.—T. B. B.—A. B. C.—G. F.—H. A. A.—H. B.—J. W. W.—P. P.—J. B. B.—W. H. P.—G. E. R.—C. L.—E. C.—W. H. W.—G.—B. W. F.

COLLECTING AND PRESERVING.

No. VI.—BEETLES.

By E. C. Rye.

THE general rules, so ably expounded by Dr. Knaggs in his recent article on *Lepidoptera* in this Magazine, as to constant alertness and making "the reason why" the starting-point of investigation, apply with equal force to the collector of *Coleoptera*, and need not be here recapitulated. But they do not, in the instance of the latter, require generally to be observed, except as to the perfect state of beetles; for, owing to the hidden earlier conditions of life of most of those insects, and to the long period during which these conditions exist, it is but seldom that the pursuit of rearing them, so universally and profitably adopted by the Lepidopterist, is found of much use to the collector of beetles. And this is very much to be regretted; because, in the majority of cases, if the latter succeed in rearing a beetle from its earliest stage, and keep proper notes of its appearance and habits, he will probably be adding to the general stock of knowledge, as the lives of comparatively few, even of the commonest species, are recorded from the beginning. It may be, also, in addition to the reasons above mentioned for the usual want of success attending the rearing of beetle larvæ, that the fact of bred specimens being frequently (from the artificial conditions attending their development, and from their not being allowed that length of time which, in a state of nature, they require after their final change before they are ready to take an active part in their last stage of life), not nearly so good as those taken at large, militates considerably against the more general use of this method of adding to a collection. In this respect, of course, the Lepidopterist is actuated by precisely opposite motives; as for him a bred specimen is immeasurably superior to one captured. And the fact of so few beetle larvæ being known at all, or, if known, only to the possessor of somewhat rare books, renders it very likely that a mere collector, finding a considerable expenditure of patience and trouble result in the rearing of a species of which he could at any time readily procure any number of specimens, may very probably abandon rearing for the future.

These observations, however, are not in the least intended to dissuade any one from breeding or endeavouring to breed beetles. On the contrary, it is obvious from them that it is precisely by attending to these earlier stages that the earnest student (novice or expert) has the most chance of distinguishing himself, on account of the more open field for discovery. And in the instance of many small, and especially gregarious, beetles, breeding from the larvæ is frequently very easy, if only the substances (fungus, rotten wood, roots, stems of plants, &c.) containing them be carefully left in precisely the same state as when found, and be exposed to the same atmospheric or other important conditions. In fact, to insure success and good specimens, it is best that in their early stages beetles should be "let alone severely."

It may be here observed, that we have been lately in this country indebted to the minute observations and great tact of some of our best students of *Micro-Lepidoptera* (in which branch of entomology we are second to none in Europe), for some most interesting additions to our knowledge of habits, and for long series of insects usually rare in collections.

Dismissing then the earlier stages of beetles, the following observations will apply only to the imago, or "beetle proper." And here I would repeat how evident it is, that the knowledge of "the reason why" is especially indispensable to the beetle-collector, judging from the extreme rarity of the occurrence of any new or valuable insect in the stores of a mere random collector or a beginner. For him, no old hand detects an equivalent to *Daplidice* or *Lathonia* in his duplicate boxes: whereas, among Lepidopterists, "school-boy's luck" is proverbial. I can give no reason for this statement, founded on my own (by no means trifling) experience in the way of examining specimens. And in this idea I think I am corroborated by the very great rarity in old collections and records of many species now universally common; the directions in older manuals, as to looking under stones, on walls, paths, &c., pretty clearly showing that the majority of captures in the olden time were what are now irreverently designated as "flukes." Still, it is astonishing to what good account a sharp observer may turn these casual meetings, often to him resulting in the discovery of "the reason why" as to the particular species accidentally found, and to the correlative increase of his collection. And, apart from anything but individual captures, many good (and more bad) things will constantly occur to such a collector. One, for instance, who will startle his friends in the streets, by suddenly swooping with his hat after an atom flying in the sunshine, or who is not too proud to pick up another, racing on the hot pavement, during those days of early spring, when the insect myriads, revelling in warmth and light, after their long winter's durance, may be seen madly dashing about, even in towns: on such a day, for instance, as that whereon a certain well-known doctor among the beetles found that living carabideous gem *Anchomenus sexpunctatus*, far from its native *Sphagnum* and heath, wandering on the flagstones of the W.C. district.

But, before referring to special modes of hunting, it may be as well to mention the *instrumenta belli* required for the equipment of the Coleopterist in this country. These are but few, and of the simplest kind; indeed, in entomology, as in the gentle art of angling, it is often the most roughly accoutred that secures the best basket. The umbrella-net, figured at p. 122, used both for beating into and sweeping, cannot be dispensed with, and a beating-stick can be cut out of the nearest hedge. The net itself should be of fine "cheese-cloth," or some strong fabric that allows the passage of air, but not of beetles; otherwise, if of too close a fibre, it is apt to "bag" with the inclosed air, and reject its contents during the operation of sweeping. The net being of course used with the right hand, its left top edge especially bears the brunt of the attendant friction, and gets soon worn; it is consequently advisable to have an outer strip of stout "leather-cloth" sewn strongly over the rim there for some little distance, extending that protection also to the right top edge, though not for so long a space. The curved handle of the stick should be sawn off as soon as possible; it frequently catches in the pockets of the sweeper, causing a jerk to the net, and dispersal of its contents. For a similar reason, the feruled apex may be well removed. Some collectors keep the sharp cutting edge of the spring sides of the net uncovered, sewing the net itself to holes drilled at intervals on the lower side of the springs. It will be found handy if the bag of the net be cut to a point from the front towards the handle side: this causes the contents to gravitate to the bottom, as far as possible from the point where the rim meets the substance swept.

A common umbrella (easily slung by a stout string over the back when not in use) is an admirable (some think, superior) substitute for this net, as it can be held up higher by the ferule, and tall bushes and trees (of which the branches nearer the top are usually most productive) can be beaten into it with more certainty of their beetle-contents being caught. The steel frames will be found in the way when the beetles are being bottled; consequently, a good large gingham may be consecrated to collecting, and its inside (not the open ribs) covered all over up to the middle (leaving no aperture there if possible) with thin white calico, stitched *over* the frame.

Another good form of net for sweeping or dragging in long grass and herbage, is of the common fishing landing-net description, made of very stout wrought-iron or steel wire, either in a simple hoop, if a moderate size only be required, or with a single-stopped hinge to fold into two, or with three such hinges, folding into four, as may be desired. I have used one of these four-folding nets for years, and never found it fail. One end is hammered out flat and perforated, the other forming a male screw, bent at right angles with the body of the frame, passes through the hole, and fits into a female screw in a strong and long ferule, fixed in the usual way to the end of a stout oaken walking-stick. As the power exerted in sweeping with such a net is great, and the action continuous, the simple screw is not enough, and a small screw-hole is drilled right through the ferule and the screw end of the net; a small thumb-screw, in shape like an old-fashioned clock key, going transversely through both, and effectually hindering lateral displacement. The framework of the net and the ferule are better made of the same metal, because, if made of two metals of different density, the stronger soon wears away the weaker; and the stick must be inserted deeply into the ferule, and held on with *two* deep pins or small screws on opposite sides, one being insufficient to stand the strain. The net, of the same substance as that above mentioned, is made with a loose "hem" to slip on the frame before screwing it in the ferule.

A leather-cloth edging all round is advisable, and the bag should be cut long enough to prevent the possibility of the contents jerking out. Another very good plan for securing the frame to the ferule is to have both ends of it soldered together into a deep square-sided plug, fitting into a corresponding hole in the ferule. The small cross-screw or pin is here also to be used, but the angles of the plug naturally keep a much tighter hold than the worm of a screw. Such a frame as this cannot, of course, be folded.

For water-beetles, a similar net to that last-mentioned is effective, but it should be stouter and with a flat front, for dredging closely against the sides and bottoms of ponds. The best substance for its bag is fine sampler canvass; and a very large stout bamboo cane is at once light and strong for its stick. To avoid friction, the bag may be affixed to small wire rings let into holes on the lower edge of the frame, or running on the frame itself.

A sieve is one of the most remunerative implements, and may be procured either simple or folding. It consists of a stout wire-framed circle, connected by a strong linen band, six inches deep, with the bottom of an ordinary wire sieve, the meshes of which are wide enough to allow any beetle to pass through. Leaves, grass, flood-refuse, ants' nests' materials, cut-grass, sea-weed, haystack and other *débris*, are roughly shaken in this over a sheet of brown paper, which should invariably form part of a Coleopterist's apparatus. A stout piece of double water-proof material may be substituted; and, in marsh-collecting, must be used as a kneeling-pad.

For ordinary bark-collecting, a strong ripping-chisel (of which the blade is well collared, so as not to slip) is as useful a tool as can be procured; but for *real* tree-working, no ordinary portable implement is thoroughly effective. Light steel hammers with a lever spike may delude the collector; but a woodman's axe, a saw, a pickaxe or crowbar, will often be found not too strong. For cutting tufts, &c., a strong garden pruning-knife is good, and an old fixed-handled dinner-knife (carried in a sheath) better.

For holding the results of the operation of these instruments, the collector needs but one or two collecting-bottles,—one rather small and circular, of as clear and strong glass (*not* cast) as can be got, with a wide mouth and flat bottom. Its neck should not slope, but be of even width, or the cork will often get out of itself. This cork should be a deep one, and be perforated longitudinally by a stout and large round quill, the bottom of which should be level with the bottom of the cork, the top projecting some inch and a half, with the upper orifice not cut off straight, but slightly sloped diagonally, so as more easily to scoop up beetles from the net or hand. It is closed with an *accurately-fitting*, soft, wooden plug, rather longer than the quill, reaching exactly to the bottom of it, but with its top projecting above the top of the quill, and broader than it, so as to be easily pulled out by the teeth when the hands are occupied. The bottle should be secured by stout twine to the buttonhole, enough play being left for it to reach the net in any ordinary position. I usually secure the external junction of quill and cork with red sealing-wax, and have more than once found the bright red catch my eye when I have lost my bottle. [N.B. This loss will always happen to every collector; generally after a peculiarly lucky day's work: so use the string-preventive.] The body of the bottle may usefully be half-covered with white paper gummed on. A few stout, plain glass tubes, papered in like way, and with plain corks, should be carried for special captures; and a cyanide-bottle, as mentioned at p. 124,* or one containing bruised and shredded young laurel-shoots, will be found useful for safely bringing home larger species, or such as would devour their fellow-captives. Put in these latter, beetles almost instantly die and become rigid, needing a stay of two days or so to become relaxed, in which condition they will then safely remain for a considerable period. In the first collecting-bottle a piece of muslin should be put, to give the contents foothold: these are brought home alive, and killed by bodily immersion in boiling water, after which they are placed on blotting-paper to drain off superfluous moisture.

Good things should always, when practicable, be set out at once, as the pubescence is apt to get matted if they are consigned for too long a period to the laurel- or cyanide-bottle; but such as remain unmounted can be put in a little muslin bag, and deposited in laurel until a more convenient opportunity. Beetles also, when taken in large numbers during an expedition into a productive locality, may be collected indiscriminately into a bottle containing sawdust (sifted to get rid both of large pieces and actual dust), and a small piece of cyanide of potassium. Each night, on reaching home, these will be found to be dead, and they can then be transferred to a larger bottle or air-tight tin can, partially filled with the same materials and a little carbolic acid to check undue moisture. Filled up with sawdust, this will travel in safety for any distance, and almost any time.

Species of moderate size, say up to that of an ordinary *Harpalus*, are in this country usually mounted on card. Much is to be said both for and against this practice; it enables the proportions and formation of limbs to be well appreciated, and it preserves the specimens securely; but there can be no doubt that it prevents an inspection of the

* "Killing-bottles," containing a layer of cyanide of potassium and gypsum, may be bought at most natural-history apparatus dealers, and are useful as relaxing depôts.

under side, except at the trouble of extra manipulation in floating off and reversing, and that the gum used clogs the smaller portions of the insect that come in contact with it. Specimens larger than those mentioned should be pinned through the centre of the upper third of the right wing-case, and the limbs extended in position with pins on a setting-board, made of a flat strip of cork glued on deal. Both these and the mounted examples must be left to dry, for a week at least, in the open air; if the boards are fitted to a frame, let them be so placed that the specimens are bottom upwards. Specimens dry more rapidly in spring and summer than at any other time, and of course more readily in dry weather.

For mounting specimens, five or six small pieces of the finest and most transparent gum tragacanth, or "gum dragon," with the same number of pieces of clear gum arabic, are to be put in a wide-mouthed bottle with about a large wine-glassful of cold water. In a short time (twenty-four hours at most) the gum absorbs the fluid and swells; then add half as much more water, and stir the mixture, which, on being left for another twenty-four hours at most, will be ready for use. The gum should be dull white, of even texture, and not quite fluid. Never make a large quantity at one time, or be persuaded to put *anything* else into it. Card for mounting should be the whitest, smoothest, and best that can be procured. "Four-sheet Bristol board" for large specimens, and three-sheet for ordinary use, are about the proper degrees of thickness. Robersons, of Long Acre, artists' colourmen, have promised the writer to turn out cardboard of this kind with an extra milling, to insure a good surface. Upon strips of this card, pinned on a setting-board, the insects to be set out are mounted, one at a time, and not too close to each other, each on a separate "dab" of the gum, the limbs being duly set out with a fine pin or needle mounted in a paint-brush stick. A pin with the point very finely turned, so as to form a minute hook, is very useful; and for extremely minute work a "bead-needle" is valuable. The gum-brush should not be used in setting, but one or two very fine-pointed camel's-hair brushes may be found of advantage. Before mounting, reverse the specimen on the blotting-paper, and brush out its limbs as far as practicable with a damp flat brush. Very refractory individuals may require to be gummed on their backs; as soon as the gum is dry, their limbs can be more easily got into position, and they can then be gently damped off their temporary mount, and treated as above.

A small pair of brass microscope-forceps, ground or cut to a minute point, will often materially assist in getting refractory limbs into position. French white liquid glue (not made of shell-lac) is useful for fastening down larger specimens, as it is very strong and dries readily; and with a very small quantity of it rows of specimens can quickly and securely be roughly mounted, in the continental way, which is preferable in many cases to leaving the insects for a long time in laurel before setting them out. Such specimens can afterwards, if desired, be relaxed by leaving them on damp sand, or in the cyanide- or laurel-bottle, and be then set in the way above indicated.

Care must be taken, in setting, not to put the specimen lop-sided on the card, or to distort its segments unnaturally by pulling them out of position, &c., and not to allow gum to lodge anywhere on the upper surface. It is easy, soon after a specimen is securely mounted, to remove with clean water and brush any superfluous gum. In preparing such insects as are liable to "run up" in drying (*e.g.* the *Staphylinidæ*), the abdomen should be duly pulled out by a bead-needle inserted at its apex; and, to prevent the contraction of the internal muscles in drying, this part may be held with the liquid glue above mentioned. Usually, by putting these insects as soon as mounted into a box and keeping it closed for a few hours, while the first drying takes place, the proper dimensions of the abdomen may be preserved, and thus the natural facies of the insect retained. The contents of the bodies of very large insects may well be removed, either by the anal orifice, or by an incision on the lower side of the abdomen. The Oil-beetles (*Meloë*) alone require careful stuffing. This is best done by separating the entire abdomen from the metathorax, beneath the elytra, and close to their point of insertion: the body is then easily emptied and washed out, and may be filled with cut-up wool, which packs closely: when gummed on again, the junction is not visible, and the entire insect preserves its wonderfully obese appearance.

To save time, in mounting many specimens, it is better to merely gum straight on the strip of card as many specimens as can be managed at a sitting. The left side of each of these can then be slightly damped with clear cold water, and its left limbs set out: when all are thus done, the first one will be nearly, if not quite, ready to have its right side treated in like manner; and so on to the end. Very refractory specimens will sometimes require to be even held down with little braces of card on pins, and to have each limb damped and set out by a separate operation. The card of large specimens will often curl upwards in drying, owing to the amount of damp; to counteract this, the *lower* face of the card may be washed with a wet brush, just before gumming its surface.

Before putting insects away, when dry, the individual specimens should be cut off the strips of card by a straight cut on each side, one at right angles to the sides in front, and another behind, all (except the last) close to the tips of the limbs as set out, so that the whole card forms a parallelogram:

a very little practice will enable the operator to do this both certainly and quickly. No two individuals, save perhaps a male and female, of whose sexual relations there can be no doubt, or an example mounted on its back, to show its underside, along with a member of the same species, should be allowed to continue on one card; much less should *a row* of any species be left together. And each specimen should have sufficient card left *behind* it to allow of a glass of high power being passed between it everywhere and its pin. The pin should perforate the card in the middle of, and close to, its hinder margin; and the whole card be lifted three-fourths up the pin, to keep it from mites and dirt as much as possible. Proper entomological pins can be obtained of all sizes at the agents of Edelsten, 17, Silver Street, St. Martin's-le-Grand, also (with all other apparatus) of any natural-history agent or dealer in London; such as Mr. E. W. Janson, 28, Museum Street, or Cooke, New Oxford Street. "No. 8" pin is, perhaps, the most useful size. In removing many specimens, proper insect-forceps will be found handy: these can be obtained at the two last addresses, or of Buck, cutler, Tottenham Court Road.

Specimens will occasionally become discoloured with grease, usually from defective drying, though many water-beetles and internal feeders, and most autumn-caught specimens, are specially liable to this defect. Benzine is an effectual remedy for it, and for mites, and can be liberally applied with a brush. Carbolic or phænic acid, dissolved in that fluid (or alone, see p. 126), is an effectual safeguard against mould from damp. To re-card a specimen that has become discoloured (whether from either of these causes, or from age), it is only necessary that it should be floated in cold water for a few minutes; the insect can then be dried, well saturated with benzine, and again mounted, looking as fresh as ever. But in re-carding specimens it is necessary to be very careful with such as were originally kept too long in laurel- or cyanide-bottle, as they are apt to become so rotten that a little damp will cause a "solution of continuity."

As to storing the specimens when quite dry, I can add nothing to the excellent observations of Dr. Knaggs at p. 126, the same remarks applying with equal force to *Coleoptera;* except, perhaps, that, even when the collector has (and is satisfied with) a cabinet, he is likely, in proportion to the *real* work done by him, to establish type-boxes of all the difficult groups.

For the examination of insects, readily manipulated by being pinned singly on a square flat thick piece of cork or bung, a pocket glass is, of course, necessary. In this case, the best instrument is the cheapest in the long run, whatever it cost; and one by a good maker, such as Ross, with modifications of four powers, will suffice for any ordinary work. For very small species, a Coddington, of the clearest definition and highest power attainable, is of immense help. But when the collector finds that he needs a compound microscope to separate species, it is the firm opinion of the present writer that that collector had better take to some other pursuit than studying *Coleoptera.* To any one, however, whose researches entail an examination of the minute cibarian and other organs of beetles, whether for purposes of classification or otherwise, the compound is absolutely necessary; though even then the lower powers are usually sufficient. For rough dissection, all that is needed are a very small oculist's lance-headed dissecting-knife and a stout and fine needle. With these, under a lens mounted on a little stage to allow the free use of both hands, much may be done. The writer, however, has seen and used a very pretty (and comparatively inexpensive) dissecting-stand, with various powers and much latitude of motion, by Ross.

After mentioning that, in sending mounted beetles by post to correspondents, it is far more practical to use a *strong* box, not too deep, to fasten the pins securely, with a layer of manufactured wool in the lid (glazed side towards the beetles, so as not to catch limbs), and to put more wool outside, and write the address and affix the stamp on a label attached, than it is to pack carelessly, write "with care" outside,* and then grumble at the Post-office because the insects are broken, I think I cannot, with use, say anything more upon beetles in their preserved condition; and I will therefore now give some hints as to their haunts when alive.

To exhaust the accidental-capture system above alluded to, mention must first be made of sand-pit collecting, a most profitable employment, especially in spring and early summer. A clean, straight-sided silver-sand pit is the best, and, if in or near a wood, its attractions will be at their highest. Beetles, flying of an evening and by night, dash against the pit sides and fall to the bottom; others merely crawl in for shelter, or tumble over the sides, and many seem attracted by the mere damp at the bottom or in the corners. Old collectors used to recommend a sheet spread out to attract insects; and there is no doubt that a certain number can be found by such means, just as they can be picked up floating on horse-troughs or on ponds. Artificial traps exist in the corridors of the Crystal Palace, some half-inclosed country railway stations, and such places; crawling up the windows of which many specimens are to be found. But these can only be considered as indications of what species occur in the district, as they are mere stragglers. Deliberately laying traps in sand-pits, on commons,

* It is, however, always as well to write "Insects," signifying contents that are "caviare to the million," and, therefore, not likely to be appropriated *en route.*

&c., will be found most productive: small dead animals, fir-branches, dead leaves, &c., can be examined time after time with profit in such situations.

After heavy floods, as during severe droughts, beetles may be found in great profusion; in the former case by sifting the refuse left by the water; in the latter by diligently examining the damp residuum of former ponds, and, if no damp be found, by even searching below the surface where it last occurred.

The wet hay, often decayed and mouldy, at the bottoms of stacks, which bad farmers have placed directly on the ground, will be found to teem with beetle-life; as will the margins of dung and vegetable-refuse heaps, wood-stacks, cut grass, &c.; and many good things may be taken by gently waving a light gauze net to and fro, just before sunset, close to such places, whither the instinct of nature impels the flight of myriads.

In winter, isolated tufts of grass in wet places, on the margins of streams, the crests of banks, &c., must be cut close to the ground, and gently torn in pieces over brown paper. Wherever many insects seem to be found, it will in most of these cases be found advisable to sift the fragments, and bring home the beetles and small stuff unexamined in a bag with a string at the neck to prevent their escape. Moss should be treated in this way, and the layers of black and rotting leaves found in woods, especially at their outskirts. Beech leaves usually produce many species, and the autumn and spring are the best times for hunting for them.

In winter, also, many species will be found hybernating in grass at the roots of trees, under bark, &c., in conditions not usual with them at other times.

In autumn, fungi, in woods especially, will be found most productive.

General sweeping, except during the winter, will always be more or less remunerative. No general rules can be laid down for this; in a good neighbourhood (on chalk or sand, or both joined) beetles will swarm almost anywhere in due season, and the most unlikely-looking spots will frequently be found the best in the end. In luxuriant herbage, among low shrubs, in the close-growing vegetation of hillsides, the sweeping-net may be plied with success; but the best way, with all *Phytophaga* at least, is to start with a fixed idea as to catching certain definite species, and then, at the right time, to hunt for such plants as these are known or supposed to frequent; and, such failing in the district, to try their allies. Of course, the collector will not fail to sweep flowers in woods and lanes, whereon, in the hot sunshine, many showy beetles bask. Many good things will be found by sweeping under fir-trees, especially towards evening, and even by night; in many places, especially marshes, nocturnal feeders may be secured by the vague use of this net. By night also many species may be found at sugar put on trees for moths, and on ivy or sallow-blossom.

Beating is most productive in early summer, especially in the second year's growth of young cuttings in woods, and the Oak, Hazel, and Poplar will generally yield many species to the tap of the stick. Good thick, and especially *old* hedges, must also be always carefully thrashed into the net; very many good things, otherwise not procurable, will reward this toil. Another scheme for getting rare species is to beat the tops of trees with a long pole, placing beneath a sheet or tent-covering.

Breaking away the extreme edges of banks, throwing water on them, treading heavily on the margins, diligently examining grass and roots close to the water, reeds (especially if cut and on the ground in heaps), &c., will bring to light great numbers of wet-looking beetles. Water-beetles, pure and simple, must be dragged and dredged for, especially round water-plants beneath the surface, and along the sides of ponds, in eddies of running streams, in the moss on stones in them, and on the stones themselves, &c.

The *Coprophaga* will be found readily in the droppings of various *Mammalia*, and also in holes bored in the ground beneath, often to a great depth. An easy and clean way to secure them is to throw droppings, ground and all, into water, the beetles coming to the surface.

As to wood-beetles, they must be sought for under and in bark, in solid wood, in decaying branches, and such places; a rule to be remembered is that most of these occur at the *tops* of trees: hence the paucity of so many species in collections. Indeed, to properly hunt for the majority of them, it is necessary to obtain *carte blanche* and a ladder, if any success be hoped for. Felled trunks are, of course, easy to manipulate; and their freshly-cut stumps, exuding either resin or a peculiar and often sweet *mucor*, are very attractive to many beetles, as is freshly-cut sawdust, and, most especially, the (to us) fetid and acrid juice resulting from the attacks of the larva of the Goat-moth. Rotten fruit, &c., is also not to be passed by without examination. Many small species occur in, or can be reared from, the topmost twigs of trees blown down by the wind.

Dead animals, as before mentioned, must be examined, as must the vegetation and soil near them. A keeper's tree in a wood will always produce something for the collector, who need only hold his net beneath the gibbeted *feræ* and bang their hides and bones with his beating-stick. During different stages of decomposition and desiccation, beetles of widely varied affinities will result from this method of collecting.

Ants' nests would require a special notice, so productive are they: their material can be sifted and their neighbouring "runs" or paths examined, traps laid near or on them, and periodically cleared out, &c. Bees' and wasps' nests also produce good, though fewer species, and are, moreover, not quite so easy of access. The nests of birds, especially if the latter are gregarious, and, indeed, the habitations of any animals, will be found to harbour many beetles, amongst other insects.

In gardens, the beetle-collector should lay cunning traps of cut grass, twigs, planks, bones, &c.; by a periodical examination of which he will secure many good things. If there be a hothouse about the premises, it and its belongings will always act as a bait.

Large tracts of waste land and commons, though superficially apparently unproductive, often contain congregations of good species, in some little oasis of damp or vegetation; moreover, on them several peculiar beetles occur. Hills and mountains will often suddenly repay the toil of the collector, who has despondently worked his way up, turning over stones, and finding comparatively nothing. The moss, &c., attending the channels of any streams in such places should be carefully searched, and the stones on the top especially not neglected. River banks and salt marshes are invariably frequented by good insects, and the very heaps of seaweed, dry or wet, on the shore harbour countless beetles. In such places small sand-loving plants should be pulled up by the roots, and, with the neighbouring soil, shaken over brown paper. The sand itself may in many instances be scraped, and burrowing beetles brought to light; but if the hunter comes upon a dead fish or bird, a full bottle will be his.

Thus it will be seen that almost every locality contains beetles, if the collector can only detect them (and it may be as well here to impress on him that it is better to bottle a dubious insect and examine it at home, than to reject it for being *apparently* common). Still there can be no doubt that certain soils and districts are much more productive than others; for instance, most of the midland and western counties, and some of the south-western, are not by any means so prolific as the eastern, southern, and many parts of the northern districts of Great Britain; clay being the worst of all soils for the Coleopterist.

The collector will do well, after a first hurried "burst" at all beetles that come in his way, to select a special group, and lay himself to work it carefully, buying or borrowing the works of authorities upon it, and making himself master of the *botany* connected with it, if it be a group of plant-frequenting habits. By such a way of working, he will more quickly, though step by step, acquire a good collection, and a stock of useful knowledge, than by any other. He will of course keep a register of the date and place of capture, and any peculiarity of habit of each insect he takes. Figures of the date of the year (usually the last two are sufficient), followed by another set, commencing with 1, will usually be quite enough; corresponding entries being made in the first column of a ruled diary. These figures may be written in ink on the underside of the card of a mounted specimen, or on a circular disc of paper, pierced by the pin of one too large to be carded.

THE PIRATE.

(*Aphrodederus sayanus*, Cuv.)

By Charles C. Abbott, M.D.

OVER and under the pebbles and roots, through grassy hill-top meadow, and dashing down a dozen feet of sober-sided rocks, sports, with never-ceasing cheerfulness, that glorious stream Belle Brook, laughing a sweet rippling laugh at the century-old hemlocks that lean their towering trunks over and far above it, and then, in a quiet nook, kissing their feet as if to atone for its presumption, and off to "fresh woods and pastures new," rushing in hot haste over scores of opposing boulders, and then, worn by the wild play with ten miles of mountains, languidly seeking a rest in the bosom of the Delaware.

In a wondrously crooked arm of this Belle Brook, I captured the savage customer here figured, *as* he is figured. I had always considered this "arm" the most interesting stream of its size, in an ichthyological view, I had ever visited; for, from trout, the piscian prince, to lampreys, the fag-end of findom, there is everything that the waters of the whole county can boast. Now, I am sure, this "arm" must take the lead.

In Science-Gossip for February of the present year, I briefly referred to capturing this peculiar fish at odd times, with a hook and line; but verily! I never imagined that an adult "pirate" could be taken in such a plight as this one is; although swallowing smaller fish is no unusual practice with them. I had been taking some small cyprinoids and a few large etheostomoids for specimens, when suddenly down went the little cork far out of sight, and the little ash whip, that I used as a pole, bent nearly double with the strain upon it. I supposed a small pike or large sun-fish had seized the hook, or a pestiferous spotted turtle, which seems to delight in exciting the ire of the best-natured anglers; and I was not a little astonished when this fine pirate, with a full-grown hybopsis sticking from his mouth, made his appearance. He had contrived somehow to suck in the hook at the angle of the jaws, and then put off with it, determining, I suppose, to season his fish diet with warm sauce. Well, I landed him, took his picture just as he appeared, and here it is! Never had a fish a more angry look than he. And his looks only reflected his feelings; for had his jaws not been fixed by the minnow that projected from them, he certainly would have bitten me. Carelessly handling them in the bottom of a scoop net, they have more than once seized my finger, and held on like grim death. We well remember seeing one once with a firm hold upon a lamprey (*Petromyzon*), and in spite of all the latter's exertions and vehement rubbing against stones and the exposed roots of the overhanging trees, the Pirate held on, apparently forcing its teeth deeper and deeper into the lamprey's flesh, judging by the movements of his head and jaws. Presently he loosed his hold very suddenly, and was gone like a flash; and the cause proved to be that a new enemy, in the shape of a cat-fish (*Amiurus*), had intruded upon his favourite haunt, the tangled roots of a water-birch that stood upon the very edge of the stream.

If undisturbed, the "Pirate" will remain, during the day, among these roots, gently moving to and fro a distance of about one-fourth his length, propelling and receding by a scarcely discernible movement of his pectoral fins. On the approach of evening, however, a disposition to move about shows itself, and slowly, without apparent object, he wanders here and there, until he finds one or more minnows near him, when his whole manner changes, and, all activity, he chases these little fish until an opportunity presents itself, when, with a rapidity of movement equal to that of a pike, he rushes upon his victim and swallows it, almost invariably head-foremost. As is frequently the case, the swallowed fish is too large for the throat of the swallower, and in that case, he resumes his favourite position, and there remains until the fish has been digested, or he has been enabled to wear away with his teeth the projecting portion of the swallowed fish. This habit is easily demonstrated by confining the "Pirate" in an aquarium, where we once saw a still stranger sight, as but one minnow was allowed to two "Pirates," and the smaller having seized the projecting portion of the swallowed minnow, he was brought nose to nose with his fellow, and there they remained the greater part of a day.

In May (in New Jersey) the young fish make their appearance, and are a favourite food of the adult fish, which will account for the fact of the species not being as abundant as the many cyprinoids we have, known as "Roach," "Chub," "Dace," and "Shiners."

The "Pirate" is found in the majority of the streams along our seaboard, from New York to Louisiana, a long stretch of land, and one that includes three or four distinct *ichthyic faunas*, this being one of the few species that is common to them all.

Trenton, New Jersey. U. S. A.

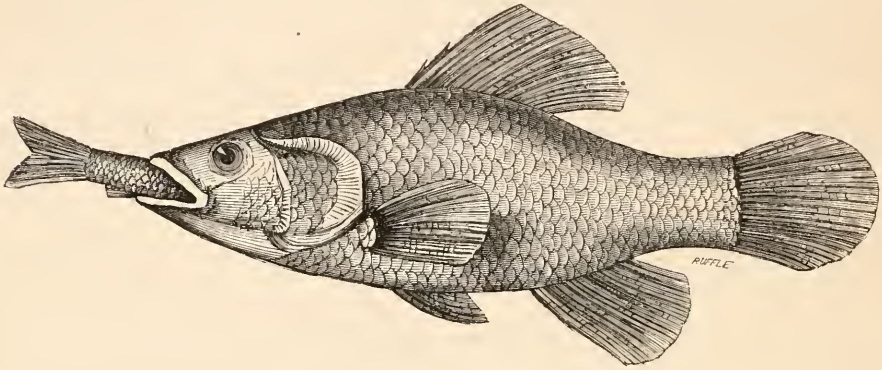

Fig. 103. The Pirate-fish (*Aphrodederus sayanus*).

THE CHARLOCK.

By Major Holland, R.M.L.I.

In Sowerby's English Botany there are coloured plates and full descriptions of three distinct plants, each popularly or provincially known as Charlock. All three belong to the order *Cruciferæ;* two are species of the genus *Raphanus*, and the third is a species of the genus *Brassica*. It is about the latter — the Charlock, or Corn Mustard — *Brassica Sinapistrum* — that I am about to gossip. The French call it *Moutarde des champs*, an apt designation, which at once distinguishes and identifies it, denotes its generic or specific affinities, and tells us of its habitat; the German name *Der Acker Senf* has precisely the same signification as the French.

"It is a troublesome weed on arable land throughout England, but is capable of being used when boiled as a pot-herb, and is so employed in Sweden and Ireland. It is much relished by cattle, and especially by sheep, but is nowhere cultivated as fodder. The seeds form a good substitute for mustard, and have been used as food for birds; but, being pungent, are not desirable for them."

I remember what a pest it used to be (and I have no doubt is still) on the poor, thin, chalky soils of the Sussex downs; it flourishes on the sandy clays of the Bracklesham Beds here on the seacoast of South Hants, where its bright yellow corymbs give a golden glow to many a broad acre of the late-sown barley; and it has got such a hold upon the stiff rich lias, the oolites, and marls of fair, fat, and fertile Gloucester, that the muse of Severn-dale seized upon it as a theme for a rural lay, and the sturdy joskins make the welkin ring, and startle the echoes of the Cotteswolds with the rustic strains of

"A GLOSTERZHUR ZONG ON THE KERLOCK."*

"The Kerlock plant 's a zite to zee,
As a zhines in the vields like gowld;
But all yent gowld as glitters vree,
I wur' once by my veather towld.

"Zo I'll teke a heow † an' cut un all up,
All out o' tha' Barley ground;
An' arter that I'd like to kneow
Whur' a bit o'nast ‡ can be vound?

"But a zays, zays he, as 't 'yunt no use
Vor to gwoo to a girt expense;
Vor t'wull come ageun, whatever thee doos,
In a yur or two vrom yence.

"But Pa'sson zays as every weed,
Like the Turmuts and Whaet we seows,
Mus' all come up vrom a zort o' zeed,
Zo I wun't let 'un zeed if I kneows:

"But I'll teke a heow an' heow 'un all clane,
Right out o' the Barley ground;
Vor if I doant let 'un zeed, 'tis plane
Nat a bit o' nast can be vound."

While the above-mentioned plant is of the Mustard tribe, the other two, known by the same common English appellation, are of the Radish race. The first of these, *Raphanus Raphanistrum*—the wild Charlock, wild Radish, white or jointed Charlock—the *Radis sauvage* of the French, and *Der Acker Rettig* of the Germans—is said to be the vagrant and degenerate offspring of the cultured originals brought to our shores by the conquering legions of Cæsar: others declare that the radish was first introduced into this country from China only about 250 years ago. Radishes certainly attain to great size and perfection in "the land of Sinim." I have grown an egg-shaped variety, with a bright pink skin and very white flesh, in a garden I once had on the banks of the Wong-poo, which reached to an enormous size, without becoming rank, coarse, or stringy, or losing their delicacy of flavour; but I do not see why we should imagine that our cultivated radishes came from the far East; and that even our wild *Raphanus Raphanistrum* is but a Roman escaped from civilization and fallen in savagery; while *Raphanus maritimus*—the Sea-charlock, or Sea-radish — a comparatively rare species, scantily inhabiting here and there a cliff or sandy bank on the coast, is the only true native radish, indigenous to our British soil. Bentham is of opinion that our garden radish, *Raphanus sativus*, is only a variety of the wild *R. Raphanistrum*.

Mr. Sowerby, in his splendid and unrivalled work, gives us the history of (as well as the tales and legends connected with) all our native plants; and what pleasure and enjoyment are added to our rambles over the wild commons, and to our strolls through the quiet green lanes, by a knowledge of this quaint plant-lore, which he has so laboriously and patiently brought together and placed before us in such attractive shape. He tells us how the homely radish was a classic root, highly esteemed in the brave days of old, when simplicity, frugality, and temperance lent vigour to the life of the stern conquering race, before wealth and sloth, and luxury and sensuality had eaten out the iron heart of the warrior nation:

"A Roman meal,
Such as the mistress of the world once found
Delicious, when her patriots of high note,
Perhaps by moonlight, at their humble doors,
And under an old oak's domestic shade,
Enjoy'd, spare feast—a *radish* and an egg."

Ye gods! what digestions men must have had in the days "*intonsi Catonis*," what consciences must the *Patres conscripti* have possessed when, after dining on raw cow-cabbage and vinegar, they could sup on turnip-radishes and cold hard-boiled eggs, and lie down to rest upon their hard beds without fear of nightmare. Even in much later times, when the gluttony and self-indulgence, the ostentation and lavish waste of the noble and great, had begun to alarm the higher-minded and more thoughtful citizens, a stomach that could dispose of "three fat snails (*Helix pomatia*), two eggs, a barley cake, a lettuce, sweet wine, and snow" for supper, according to the custom of Pliny the younger, must have been tolerably sound.

I remember reading, many years ago, of a poor crazy old woman who wandered about the fields in all weathers, tearing up the Charlock when it began to bloom. Her son, an idle vagabond, who shunned all steady regular work, had managed to live by smuggling and poaching; at last he was tempted to waylay and rob a poor travelling pedlar: he attacked him one wild stormy night as he was crossing some fields by a lonely, unfrequented foot-

* From the Proceedings of the Cotteswold Club.

† Anglicè, *Hoe*. The root is the Saxon *Heawan*, to cut.

‡ *Nast*, a generic term for dirt, applied more particularly to weeds. Picking nast, or burning nast, will mean picking couch, burning weeds, &c. The root of this word, though difficult to trace, is not entirely lost. Its primary meaning is that of *filth* or *dirt*; a sense preserved in the adjective *nasty*. It has no substantive form in English. The Swedish has *nesa*, dishonour, shame; and the Old Norse, *neiss*, shameful; secondary derivatives from the same root.

path, striking the old man down from behind with a bludgeon; while rifling his pockets, the moon suddenly appeared from behind a black cloud, and lighted up the robber's features; the pedlar recognized him, and calling him by name, told him that the slow but sure hand of justice would overtake him one day. "You shan't be a witness against me, at any rate, I'll make sure of you; dead men tell no tales:" and the robber became a murderer. "You shouldn't have talked about the gallows, old man," said the ruffian, jeering the dying man; "where will the witnesses be when you're buried deep down, and the waving corn grows over the place—aha! who'll be your witnesses then, I wonder?" "These! these!" moaned the victim, tearing up a handful of blood-bedabbled weeds from the trampled earth, and dashing them all wet and reeking in the murderer's face,—"the wild Charlocks that see me die, shall nod their yellow heads at you, and my blood's cry to Heaven for vengeance shall be heard, and the yellow blossoms shall be my witnesses against you as long as the Charlock blooms wild in the cornfields." The wretch trembled as the dank plants struck him, and stained his face; then he dragged the body away and buried it deep down in a newly-ploughed field; and corn was sown and grew up over it, and all trace of the horrid deed seemed to be put for ever out of sight. But the pedlar was missed from his accustomed beat, and people began to talk and wonder if he had met with foul play, and they joked the assassin, and asked him whether the money he spent so freely had been taken from the missing traveller. The spring came round, and the weeds sprang up amongst the green corn; but in one lone field there came such a mass of yellow charlock-weed in one particular spot that the farmer noticed it, and sent men to root it up; but it sprang up again and again, and the guilty miscreant quaked when the neighbours talked about it, and at last he was seen stealing out at night and tearing the rank weeds up. Suspicion was aroused, the soil was turned up, and the body of the missing pedlar was found and identified. The terror-stricken murderer confessed, and told the whole tale; he was hanged, as he well deserved to be; his poor widowed mother went mad with grief; but, unable to realize the actual death of her only child, and with the pedlar's dying cry for ever ringing in her ears, she wandered in the fields tearing up the Charlock, that its golden blossoms might not wag their heads and bear witness against her lost and ruined son.

Bury Cross, Gosport.

"When Alexander the Great went on his Indian expedition he opened the way for many discoveries. The Ringed Parakeet was soon afterwards brought to Greece."—"*Beautiful Birds in Far-off Lands.*"

SPARROW BRAWLS.

The social habits of our attached friends the Sparrows, must at this time of year attract the notice of the most unobserving. Like other parasites, they are not long out of sight at any season, but on the approach of spring, every nook around the homestead rings in turn with their squabbles, and there is not a city garden with a shrub in it, which does not re-echo with their eager reproaches. The noise, considering the size of the performers, is wonderful. The greater frequency of these affrays in the spring months leads to the presumption that they arise from jealousy amongst the male birds. But this I believe to be an error. My lot is cast in a large seaside town, and the chief enjoyment I can get of the beauties of nature is derived from a few poplar trees, planted, by necessity, much nearer to my study-window than a country gentleman would think desirable. The necessity, however, like most of the decrees of Providence, is not without advantage. It brings my feathered friends, in whom I delight, under much closer observation. Here, in their season of verdure, the trees are visited by Chiff-chaffs, Willow-wrens, and two species of Titmouse; whilst in severe weather strange visitors are driven down from the hills, such as the Missel-thrush, the Blackbird, the Song-thrush, and the Redwing. Redbreasts, Brown Wrens, Hedge-sparrows, and House-sparrows are here at all seasons, and the last fully as saucy and cunning as any of their tribe. For some considerable time I have been in the habit of watching their conduct, and whenever the first note of discord has arisen, I have noted their proceedings with particular attention. As would be supposed, the actors are one female and several males. The latter, however, are not, as would be expected, contending with one another, but all—excepting one, teasing rather than seriously attacking the hen, who always occupies the centre. One of the male birds does nothing but flounder about in a ridiculous manner, throwing back his head, drooping his wings, and uttering a peculiar chirp, which seems to goad the rest of his sex to frenzy. The female frequently rushes at this lackadaisical performer, and pecks at him with fury. He never returns the blow, but retreats a short distance, whilst one of the males attacks the hen from behind and diverts her wrath upon himself. I have never seen the male birds assail one another at such times. Sometimes their emotion, whatever its nature, is so vehement, that they are all down together in inextricable confusion; but the moment the paroxysm is over, they always act as I have described above. It is the cry of the male bird beginning his singular performance before the female, which instantly summons all the cock-birds in the vicinity to the scene. The first comers dash into the *mêlée* without a moment's hesitation. The late arrivals often take no part in the affair, beyond cheering on the principals with a few sharp notes. At length, as in human squabbles, the absurdity and uselessness of the whole thing seem to strike every one—the outsiders retire, and the chief actors begin to draw off: the lover, if such is his character, performs with less *empressement*, the lady becomes more indifferent to his "chaff." Agamemnon and Menelaus go off together *κατὰ κλισίας τε νέας τε*, Paris himself steals away by degrees, and Helen is invariably left quite alone. Such are the facts, as I have witnessed them, over and over again, but their significance is not so easy to determine. It should be remembered that these birds are not polygamous, like ruffs and capercaillies, and domestic fowls, whose desperate combats are intelligible enough. There is no greater provocation to jealousy amongst sparrows than amongst linnets or buntings, which are not in the habit of brawling in this manner. sparrows, indeed, are hardly gregarious in the breeding season; each male bird has his own mate, and the pair bring up their family in as exemplary a manner as many a Christian couple. Nevertheless, there is not one of these staid, business-like characters who is not ready, at a moment's notice, to engage in a furious set-to with his neighbours about one of the other sex, for whom he cares nothing a minute before or after. Moreover, these squabbles are not confined to the spring season. I have witnessed them in every month in the year, excepting during the moulting season. I will not hazard any theory respecting them, content to draw the attention of your readers to the facts of a very curious, however common, phenomenon; the object of which, like the night-crowing of the roost-cock, or the serrated claw of the Fern-owl, is, I believe, very little understood. H.

PUPA ENEMIES.

On May 2nd, I went to my pupa-cage to look for "fresh arrivals," and was very much astonished to find the pupæ were being carried off bodily by a number of large red ants. Several had been partly devoured, and others injured beyond recovery; but by a prompt and vigorous attack, the pupæ were rescued and removed, while the ants were destroyed by a copious douche of boiling water. A little searching revealed the colony, at about three yards distant from the breeding-cage. I stirred them up with a stick, and gave them a dose of the hot water; a thin stream of ants were travelling along the wall, having no doubt been informed of the "grub" by their relatives.

As I keep all my pupæ *out of doors*, and exposed to the changes of the atmosphere, such dangers must be risked. I simply place the pupæ on the top of a layer of fine sifted mould, mixed with decayed tan and silver sand: as I never moisten them, they do not damp off, and I have lost but few from dry rot. I once covered them over with moss, boiled, according to instructions; but I never saw any advantage derived from it; and as you cannot see how the pupæ are without disturbing it, I have discontinued using any moss for some time.

There are a great many other plans for rearing pupæ successfully, each of which has its supporters and followers, who of course believe it to be "infallible."

I have tried several others, and with more or less success. I should say laying them in bran is perhaps the worst, as then they invariably dry up; cotton wool produced the next smallest percentage of perfect insects. Another enemy of the moth in its pupal state is the Earwig (*Forficula*); also Cocktail or great Rove Beetle (*Creophilus maxillosus*), and such "Reptiles."

The Rev. Joseph Green, in his valuable little work on "Pupa-digging," says, "I have known a slug crawl in a straight course more than a foot up the side of my cage, to get at a chrysalis, and then feast on it till there was nothing left but the empty skin." He also states that he has seen an earwig eat a soft pupa, and gives an account of his pupæ being devoured by a brood of *Tinea pseudospretella*.

Other enemies of the pupæ, more especially when at large, are fieldmice, which are fond of soft pupæ. Those who damp their pupæ will also suffer losses from *mould*, which is very destructive to some kinds, especially those which have been moved from the cocoon.

It is curious what clusters larvæ will often form, piling the cocoons one above another, till some are not visible. I had last summer in one of my larger breeding-cages, a group consisting of 5 Drinkers (*Odonestis potatoria*), 3 Oak Eggars (*Lasiocampa Quercûs*), 7 or 8 Lackeys (*Bombyx Neustria*), 5 Figure-of-8 (*Diloba cæruleocephala*), 4 Gipsies (*Liparis dispar*), and a single Tiger (*Chelonia Caja*). I need scarcely say, I did not leave them to come out in this position, or many would no doubt have been undeveloped. I think I have given a tolerably good list of the various *enemies* or *diseases* to which the pupæ of Lepidoptera are liable; but if others have been noticed by subscribers to Science-Gossip, I shall be glad to see their remarks.

J. Henderson, Jun.

"England is the sister of Holland, but, being more enveloped, I think, in mists, owing to the warm waters of the Gulf Stream, it did not recognize until a later period the grandeur of its maritime horizon."—"*Nature*," *by Madame Michelet.*

SHRIMPS AND PRAWNS.

IT is astonishing, in vulgar classification, how size and colour determine conclusions. Its reasoning is based on just the opposite grounds to those of science. The latter investigates, analyses, wants to know the reason for every organ, rudimentary or otherwise, and refuses to be satisfied with the statement that they are complementary. It has too much faith in the wisdom of the Creator to believe in sports or freaks of any kind whatever. Every organ, whether in use or not, has a meaning; and, if we could get at it, it would doubtless help us to the history, not of the individual merely, but of the species and even genus to which its possessor belongs.

Among the common zoological objects with which the public generally come in contact, perhaps no greater ignorance is displayed than in their notions

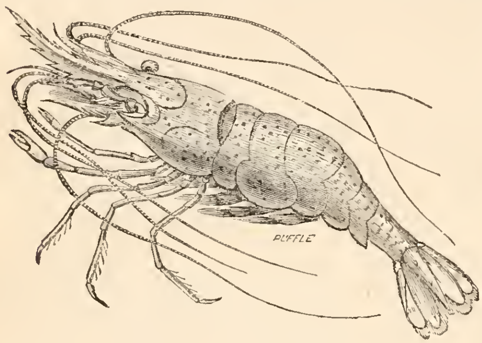

Fig. 104. *Palæmon serratus.*

of "shrimps." The old adage that all is fish which comes into the net is realized here, for all are shrimps that are sold as such. The only difference recognizable is that some are known as "red shrimps," and some as "brown." The appetizing flavour of these delicate crustaceans is perhaps not conducive to popular examination or dissection other than the stomach requires, or the great difference between the "red" and "brown" so-called shrimps would be recognizable at once. In fact, the "red shrimp" is not a "shrimp" at all, but a young prawn! It is known in many places as the "Rock shrimp," from its habits. The rostrum, or prolongation of the carapace between the antennæ, is the distinguishing feature of the prawn. In our common species this is toothed like a saw (fig. 104), whence its name of *Palæmon serratus*. Of its two pairs of antennæ, the outer are very long, twice as long as the animal's body. It is only in the young state that this species approaches our shores; but its times and seasons are well known to "shrimpers," and it falls a victim to its littoral curiosity. Bell tells us that in some parts the fishermen consider they drive away the true prawns; but the Professor believes this is due to the fact that when they have arrived at a certain size they separate from the older ones, the latter retiring farther from the shore to, return again, however, when they have reached the adult condition. It is only when they have arrived at the latter stage that the fishermen condescend to regard them as true *prawns*, and to charge for them as such!

The tail of the "red shrimp," or prawn, is worthy of notice. It is composed of five plates, capable of being folded like a lady's fan. Each plate is edged with setæ, and when alarmed, by expanding the tail and suddenly striking the water with it, its possessor can drive itself backwards to a surprising distance. It is almost comical to watch this animal investigating a strange locality—to see how gingerly it seems to walk on the very tips of its long feet, and how its swimmerets or paddles are meantime rapidly working beneath the abdomen. It progresses by means of these swimmerets exactly on the principle of a paddle-boat, and uses its tail only to retreat from danger.

Another common species of prawn is often sold as a shrimp. This is the *Palæmon squilla* (fig. 105), which resembles the true shrimp even more than

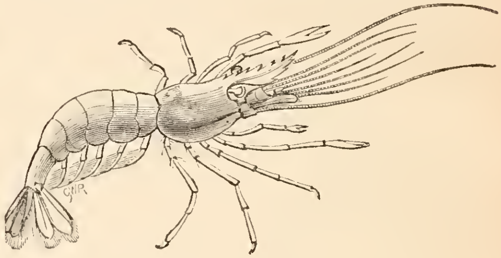

Fig. 105. *Palæmon squilla.*

the foregoing; still you may trace a similar serrated rostrum. The antennæ are not so long, and only the first pair of legs have pincers, whilst in the fore-mentioned species the first two pairs are provided with them. The common shrimp has a simple hook, bent, and springing out of a thickened base. The *serratus* when adult is four inches long, the *squilla* attaining only half that length. Two other and rarer species of prawn inhabit our seas, but these are not often sold as shrimps. In Great Yarmouth, however, another genus of crustacean shares the honour with the prawn of being an edible shrimp. This is the *Pandalus annulicornis*, whose serrated rostrum and long antennæ give it a great resemblance to the *serratus*. So abundant is it off this part of the Norfolk coast, that its capture provides many fishermen with constant employment. It differs from the true shrimp in occurring at a considerable distance from the shore; hence it goes by the name of the "sea shrimp." The greatest length it attains is two and a half inches.

And now for our old, true, and tried friend, which has generously lent the credit of its great name to the species above mentioned—the *Crangon vulgaris* (fig. 106). Practically it is distinguished from them by its common name of "sand-shrimp," and still more as the "brown." Notice its speckled back and body, and you have before you another of those instances of *mimicry* which naturalists are seeing throughout the animal kingdom. Nothing could more resemble the fine sandy bottom on which it squats, and its protection is rendered doubly sure by the jets of sand it casts up, and which settle down over it and hide it. Here you have no rostrum, but a broad, flat head, on which the eyes are placed at wide intervals between. The internal pair of antennæ terminate in two short feathered filaments, and the two movable plates outside them, bristling with setæ, distinguish the shrimps at once. The female shrimp carries her spawn underneath her

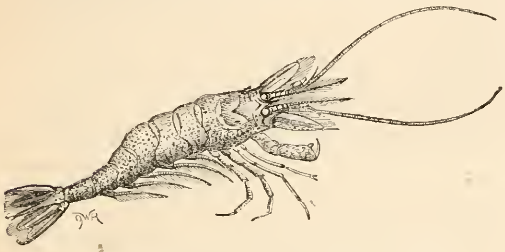

Fig. 106. Common Shrimp (*Crangon vulgaris*).

abdomen the whole year round—an occurrence which you will never find in connection with the so-called "red-shrimp," for the simple reason that the latter is only in a juvenile stage. The spawn is entangled among the "false feet," or swimmerets. There could not have been a better arrangement, considering its habits of burying itself in the sand, than the manner in which the eyes are arranged for seeing—on the top of the head. The "brown shrimps" are fond of company, and their antics on a sunny day are very joyous and vivacious. They dart about, and even skip out of the water, in their exuberance of spirits. But they are always found in shallow water, and that where there is a fine sandy bottom. Singularly enough, wherever the true shrimp occurs you get few or no "red shrimps" or prawns, one group invariably replacing the other.

J. E. Taylor.

SAWS OF SAW-FLIES.

Although most of the books on the microscope contain an accurate description of the saw of the saw-fly, and the method of its use, yet in none is there any mention of the variation in the form of the saw in the different species of the insect. Some deposit their eggs in the hard bark of certain plants, others make incisions through the softer structures of the leaves; and thus the arrangement of the teeth, and the formation of the saws themselves, vary, all making most beautiful microscopic objects. No doubt if we could know for certain the exact structures these various arrangements are intended to divide, our own mechanicians might obtain many valuable hints from studying the saws of these little insects. I have already collected and mounted, during the present season, more than a dozen saws, all perfectly different in

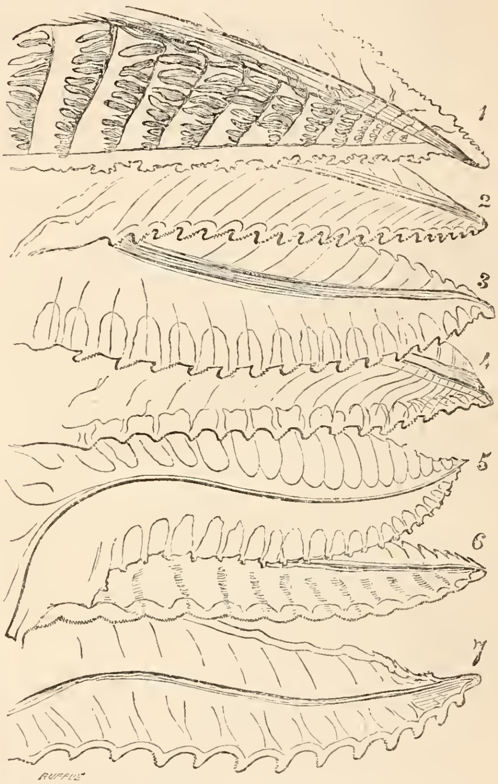

Fig. 107. Saws of Saw-flies.
No. 1. Saw of Large Green Saw-fly. 2. Black ditto. 3. Small ditto. 4. Brownish ditto. 5. Black Saw-fly, with white banded abdomen. 6. Large Yellow Saw-fly. 7. Yellow ditto, with black thorax.

formation, a few of which I have delineated. They are drawn from nature, with the neutral tint reflector, the $\frac{1}{2}$-inch objective being used. Fig. 1 is the most remarkable saw I have yet seen; for, besides being beautifully toothed, along its sides are arranged a series of scales placed in rows, the uses of which it is difficult to imagine. Having many times watched the process of depositing the egg, after the requisite incision has been made in a leaf by the insect, I cannot agree with those authors who state that the egg is passed along the saws, which form together a sort of tube for its passage to its destination. The real ovipositor is placed above the saw, and when the egg is being deposited, the saw is withdrawn into its sheath, the large size of the egg, and the very structure of the saw itself, making it impossible for the process to be accomplished as described by them. This can readily be proved by obtaining a saw-fly full of eggs, and subjecting it to pressure under the microscope, when the exact relation of the parts will be seen.—*James W. Gooch.*

THE ARCHÆOLOGY OF RARE PLANTS.

Having seen a paper by my friend Mr. Edwin Lees in Science-Gossip for April, in which he mentions the occurrence of the *Astrantia major* on the Weo Edge in this parish, I beg, with your permission, to make a few remarks on its probable history in that spot.

When a plant is found growing some hundreds of miles away from its native country, it becomes an interesting question to determine how it may have been transported to its new abode. That it has spontaneously started into existence, I presume no one will at the present time maintain. Few either would contend that the introduction of plants has taken place in a capricious way without law or system. The researches of Darwin and Lyell have clearly shown that the flora of every district is more or less related to that of the adjacent country, and that if any strange forms occur, their presence may be traced to some distinct cause. In many cases, this cause may be extremely difficult to determine; but in some, by carefully attending to the surrounding circumstances and conditions, it may be possible to form a more or less probable conjecture.

Now it seems to me that the suggestion which was made to me some years ago by a friend who takes much interest in the antiquities and natural history of this neighbourhood, as to the occurrence of the *Astrantia* on Weo Edge, has much force, and is, moreover, particularly interesting, as it connects the spot where it grows with those dim ages of a remote past which we all delight to picture to our minds, and so to realize the kind of people who lived in them.

The place—and it is the only place in England where the *Astrantia* grows with any appearance of being indigenous—is the summit of an abrupt cliff of Lower Ludlow shale, some 550 feet above the valley through which a small stream, called the Onny, flows. As elsewhere in the neighbourhood, this formation or ridge of hills is crowned by a band of what is known by geologists as the Aymestry limestone, and it is on the soil formed from the decay of this limestone that the plant in question has found a congenial home.

And now, a few words as to its foreign abode. Mr. Bentham in his Botany has the following notice of it:—"In woods and pastures in central and southern Europe, not nearer than central France; occurs apparently wild in Stokesay Wood, near Ludlow, and between Whitbourne and Malvern in Herefordshire; probably originally escaped from some old cottage garden."

I remember a few years ago taking a friend, who had travelled in Italy, to the top of the Weo Edge, without telling him of the fact of the *Astrantia* growing there, and was much struck by his exclamation of pleasure and surprise when he recognized the plant, then in full blossom, which he had last seen flourishing on one of the mountains in the north of Italy.

Can we show that any inhabitants of Italy ever had access to this spot? An answer to this question has been found in a most unexpected way. Within a few miles of the Weo Edge, and close by an ancient Roman road which wends its way between the two places, was discovered a few years ago the remains of a Roman villa, including the hypocaust, or thick mass of concrete, supported on a number of little pillars, by which the rooms were warmed. Imbedded in this concrete was found, by Mr. Stackhouse Acton, on whose ground the villa was discovered, a peculiar shell, the *Pentamerus Knightii.* Now it so happens that this fossil, which is of a remarkable and unmistakable character, is very abundant indeed at the Weo Edge, but is extremely rare, if it occurs at all, which is very doubtful, anywhere nearer to the site of the villa than that hill.

The inference from this is apparently inevitable; the Roman mason who constructed the hypocaust used lime brought from the Weo Edge, which is, moreover, the best to be had in all the country round.

Many other facts tend to the same conclusion. The *Astrantia* grows chiefly on a kind of bank which formed part of an old encampment, such as might have been constructed to defend a few dwellings, as we may well suppose the Roman colonists had frequent occasion to do. (2) The ground all round the spot is completely honeycombed by the remains of ancient limekilns, and there are innumerable mounds everywhere of the rubbish which was thrown out in raising the limestone; and (3) that the spot was frequented by waggons long before the present roads were made is shown by the remains of roads, long since unused, deeply sunk below the level of the soil, showing how much they were frequented in early times.

Is it then improbable that when the villa of which I have spoken was in the course of erection (and there is reason to think that many others of a similar kind once existed in the neighbourhood), a number of Roman workmen may have settled on this spot, and that they, in some way, brought this plant with them? How many instances are there of flowers much less attractive, having been conveyed by man to considerable distances, by accident or design! Indeed, Mr. Bentham has told me that the *Astrantia* itself was often an inmate of old cottage gardens; showing that it was not despised as an ornamental plant; in fact, though not a showy one, it is by no means common-looking or unattractive.

One more reason may be added to the above; namely, that the extent to which it has spread throughout Stokesay Wood points to the time of its introduction as being very remote.

J. D. La Touche.

Stokesay.

MICROSCOPY.

On an Improved Reflex Illuminator for the Highest Powers of the Microscope, by F. H. Wenham.—The above is the title of a paper read by one whose name has become a household word among microscopists, and all who use the microscope owe him a deep debt of gratitude for the many useful adjuncts he has from time to time invented, and given to the public, without fee or reward. Two of the best known are his paraboloid and binocular prism. The former, as most of the microscopical readers of S.-G. are aware, is used for giving a black field, whilst the object is brilliantly illuminated, and few objects are more beautiful than *Pleurosigma formosum*, *Heliopelta Metii*, or *Aulacodiscus formosus*, when illuminated by means of the paraboloid. This method for obtaining a black field is all that can be desired when no higher objective is used than a $\frac{1}{4}$; but when the highest powers came into more general use, it was felt that the black field illumination to be used with them was a desideratum. The author proposed for this purpose a small truncated lens, attached to the slide by means of oil of cassia or cloves, and beneath this the paraboloid: this produced some very good effects, but, to quote Mr. Wenham's own words, it was a clumsy and unhandy combination, and so difficult to manipulate that even in the hands of experienced microscopists it sometimes failed to show satisfactory results. The new illuminator seems in every way to be a great improvement on the old plan, and if carefully made would produce very satisfactory results. The illuminator consists of a cylinder of glass, half an inch long, and $\frac{4}{10}$ in diameter; the lower convex surface is polished to a radius of $\frac{4}{10}$; the top is flat and polished, starting from the bottom surface; the cylinder is worked off to a polished face at an angle of 64°; close beneath the cylinder is set a plano-convex lens of $1\frac{1}{4}$ focus. The action of the cylinder will be understood by referring to the following diagram (twice the real size). *a* is the cylinder, *b* the lower plano-convex lens, *d*, *d*, *d* rays of light reflected upwards from the mirror. If the two sides of the cylinder had been parallel, the rays would have passed on to *e*; but as one of the sides forms an angle with the base, the rays impinge on the sloping side, and are reflected from it upon the flat surface at such an angle as to suffer total reflection, as shown by the

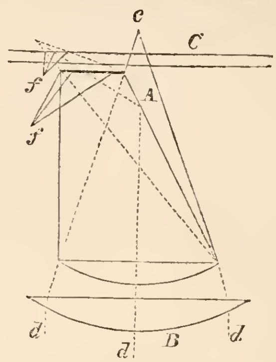

Fig. 108. Diagram of Reflex Illuminator.

black lines (*f*): if, however, a drop of water is placed on the surface of the cylinder, and brought into contact with the lower surface of a slide (*c*), the rays pass through, as shown by the dotted lines, and are now totally reflected by the upper surface, the black lines at *g* representing the reflected rays; but if an object, such as a diatom valve, or a podura scale, is in close contact with the slide, it becomes brilliantly illuminated, one portion of the ray passing into it, the other being reflected; thus giving a perfectly black field. The apparatus is made to rotate on the focus as a centre. The required objects on the slide are found by a low power. The light is thrown up either by a plane or concave mirror: the former is generally the best and most controllable. Having got the best effects, say on a diatom or insect-scale, by tilting the mirror, we now proceed to rotate the illuminator During this, the most exquisite unfolding of structure takes place. The inventor then proceeds to describe the superb appearance of the podura scale when illuminated by this contrivance. He says *Amphipleura pellucida* assumes a substantial appearance not seen in any other way, and at once displayed its striæ with an $\frac{1}{8}$ that had never resolved them before. In an addendum he describes some experiments in order to ascertain, if possible, the distance at which objects on a total reflecting surface were rendered visible by light transmitted in consequence of their presence or contact thereon, and from these experiments he inferred that no light or colour effect would be produced if the object was not within the distance of an undulation that would produce colour; this would be less than the ten-millionth of an inch. For further details we must refer the reader to the June number of the *Microscopical Journal*.—*F. Kitton.*

Monthly Microscopical Journal.—The June number of this journal is one of the best we have seen for some time, containing some first-rate articles, well illustrated, by our best writers. The new volume commences with July, and we would advise our microscopical readers to note the fact.

Polariscope Object (Glance Erde).—The powder of this mineral forms a good polariscope object, somewhat similar to the scrapings of the shell of the cuttlefish. Mounted in Canada balsam and viewed through a selenite plate, the play of colours is very brilliant, especially with a deep blue ground. If plates of mica of different thicknesses are placed on the selenite, many other tints may be obtained. I do not know if this is a common polariscope object, but I have not met with it before.—*A. B. C.*

ZOOLOGY.

Protection of Wild Fowl.—Every naturalist and lover of nature will be glad to know that the Wild Fowl Protection Bill passed its second reading on the 12th of June. The feathered favourites which add such animation to our sea cliffs, and the rare birds which have hitherto been shot down to their present rareness, will now have a chance in the arduous battle of life.

Provincial Societies.—The Transactions of the Norfolk and Norwich Naturalists' Society for 1871-2 are more than usually interesting and valuable on account of the great number of papers they contain, by competent and well-known observers, on local natural history. The Presidental address by H. Stevenson, F.L.S., is a masterly review of the work to be done, and of the papers read. An important paper by Mr. F. W. Harmer, F.G.S., on the Marine Mollusca of the Norfolk coast, is paralleled by another on the "Land and Fresh-water Shells" of the neighbourhood of Norwich, by Mr. T. B. Bridgeman, in which the writer states that 46 species of land shells and 38 fresh-water shells had been met with. Mr. T. Southwell, the hon. sec., contributes a paper on the "Occurrence of *Phoca hispida* on the Norfolk Coast;" Mr. Stevenson another on the "Scoulton Gallery;" Mr. J. E. Taylor, F.G.S., a paper on "The Norfolk Broads and Meres, geologically considered;" Mr. C. G. Barrett one on "Coast Insects found at Brandon," whilst Mr. Fred Kitton concludes with a paper of more than local interest, on the "Spongeous Origin of Flints." This paper we hope to transfer to our pages. The "Transactions" have several pages devoted to ornithological and general natural history notices, chiefly by Messrs. Stevenson and Gurney.

Fish Building Nests.—Professor Agassiz writes from St. Thomas, to give an account of his discoveries concerning the Gulf weed and its living inhabitants. The most interesting of the latter is a fish which builds a nest. The nest is a ball of sargassum about as large as two fists, and is obviously carefully formed, with elastic threads trending through it in all directions. When such a nest was put into a bowl of water, it was seen that the central portion was much more closely knitted than the rest. On the threads appeared, also, a multitude of beads irregularly strung, of about the size of a pin's head, and these beads, on examination, proved to be eggs. With a little care the eggs were preserved, and soon a dozen little fishes rewarded the Professor's new marine-hatching establishment. These fishes eventually proved to be the young of the common *Chironectus pictus*, a fish which is thus shown to construct a floating harbour for the protection, and eventually for the commissariat of its progeny. The creature which performs this wonderful work has, it seems, special un-fish-like faculties for the purpose. The pectoral fins are supported by a kind of prolonged wrist-like appendages, and the rays of the ventrals are not unlike rude fingers. With these limbs, Professor Agassiz says, these fishes have long been known to attach themselves to seaweed, and rather to walk upon it than to swim. It is now clear, also, that they use them for the construction of their nests.

A Rare British Snake.—Record has been made of the occurrence of that rare snake, *Coluber Austriacus*, in Dorsetshire. The first authenticated specimen was captured in June, 1854, and three or four others have been met with since. The Dorset individual measured over twenty-one inches in length, and when disturbed, quickly approached the intruder, with head erect, and tongue rapidly moving in and out, putting on a very defiant look.

New Species of British Coleoptera.—In the last number of the *Entomologist's Monthly Magizine*, Mr. E. C. Rye describes three new species of beetles. The first, *Scydmænus præteritus*, about half an inch long, was taken at Croydon, Erith, and in the Isle of Wight. Several other localities are also mentioned. The second species is named *Phalacrus Brisonti*, taken near Gravesend; length about one line. The third is called *Anthicus Scoticus*, one line and a quarter long, found in some numbers on the shores of Loch Leven, and elsewhere in Scotland.

Sponges.—In the June number of the *Annals and Magazine of Natural History*, Mr. H. J. Carter, F.R.S., describes two new species of sponges from the Antarctic Sea, as well as a new species of *Tethyra*, from Shetland. The latter part of the article is taken up with an interesting and elaborate account of the production of sponges, commencing from the zygosis of the sponge-animal, and tracing the gradual development of the spiculæ. Dr. J. E. Gray, F.R.S., in the same number, has an article on the classification of sponges, in which he makes some alteration in the paper on the same subject published in the "Proceedings of the Zoological Society," May, 1867.

NOXIOUS AND BENEFICIAL INSECTS.—A good example is set by the trans-Atlantic authorities to other states. Mr. Charles V. Riley, State entomologist, has just published his "Third Annual Report on the Noxious, Beneficial, and other Insects of the State of Missouri." The subject is exhaustively treated, and the illustrations numerous. The larvæ, chrysalids, and pupæ of all the insects which affect the agriculturist are carefully delineated, and their habits, structure, &c. plainly described; so that the American agriculturists possess an advantage over those of other countries in knowing which are their enemies and which their friends. The Report of the Entomological Society of Ontario for 1871 has also just appeared, including reports on some of the noxious and beneficial insects of the province, illustrated by upwards of a hundred woodcuts. The insects affecting the apple, the wheat crops, and the cabbage, are described by the Rev. C. J. S. Bethune, president of the society; those affecting the grape, the currant, and gooseberry, have been undertaken by Mr. W. Saunders, vice-president; whilst Mr. E. B. Reed has given an account of the insects in connection with the plum, potatoes, cucumber, melon, &c. The Report, therefore, is of a most valuable character, and the work well done.

THE PROTOZOA, &C.—Dr. T. C. Hilgard has recently stated before the New Orleans Academy of Sciences, that he recognized no such classes as *Protozoa* or *Protophyta*. He remarks that "all the so-called Infusoria, all the Protozoa, Protophyta, and fresh-water Algæ, so-called, are severally and collectively, in all known cases, the immature, but even thus self-multiplying germs of higher (or adult) forms of plants and animals, otherwise well known for themselves."

LARVA OF THE FOX-MOTH (*Bombyx rubi*).—The occurrence of this species in the larval state on the Sea Buckthorn is a little singular. It would be curious to note whether they would eat the leaves if they were at all moist with salt-water. These larvæ seem usually to prefer bramble or blackthorn, but they are occasionally found feeding upon clover and heather. Many entomologists have recorded it as their experience that the larva of *rubi* cannot be brought through the winter without some difficulty, most individuals dying off in confinement during November. I hope Mr. Garfit will be more fortunate with his brood. As he asks for information, I beg to quote Mr. Newman's suggestion for carrying them through. He decidedly discards the "coddling" plan of treatment which some have great faith in, and advises thus:—"Obtain a tea-chest, or some other large useless wooden box without a lid; fill the bottom with heathy turf cut from a common, put the larvæ with their food on the turf, and cover the box with wire gauze. Thus prepared, leave the whole in your garden, exposed to wind and rain, and the moths will emerge in due time." No doubt, it will be advisable to protect this receptacle from very heavy rains. I suspect, saving in very cold weather, these larvæ are seldom entirely inactive; and they should be supplied with green food now and then, which they will nibble a little. Another mode might be tried; namely, that of dividing them off into parties of about a score in each, these being placed in flowerpots, with a little dry moss at the bottom, the top being tied over with gauze. In any case, efforts must be made to obtain for the survivors (which may be but few) as early a supply of leaves or expanding buds as possible, directly the influences of the spring are showing themselves upon vegetation.—*J. R. S. C.*

SALMON SPAWNING.—It is astonishing to see in what enormous quantities, and to what great distances, the salmon ascend the Siberian rivers. Dozens of small streams which we passed in the interior of Kamschatka, seventy miles from the seacoast, were so choked up with thousands of dead, dying, and decayed fish, that we could not use the water for any purpose whatever. Even in little mountain brooks, so narrow that a child could step across them, we saw salmon eighteen or twenty inches in length, still working their way laboriously up stream, in water which was not deep enough to cover their bodies. We frequently waded in and threw them out by the dozen with our bare hands. —*Tent Life in Siberia.*

YOUNG CATERPILLARS IN CONFINEMENT.—The jam-pot will be found very serviceable for these, amongst the Micro-Lepidoptera. It has long been used by the rearers of the Tincina, as leaves kept therein do not dry up speedily. The top is covered with a piece of plate-glass in that case; but, in using it for young caterpillars of the Bombyces and Geometræ, I have tied it over with gauze or muslin. Small twigs of shrubs, or stalks of herbaceous plants, may be kept fresh in such a receptacle for some days. One drawback, however, is this, that what answers very well in so far as the food is concerned, does not always suit the young larvæ. When the weather is cold, and they happen to place themselves on the sides of the pot, they are liable to become cramped, and are afterwards scarcely able to move about, or grasp leaves and twigs for some days. Indeed, in the case of some species, this will prove actually fatal, as I found last spring with a brood of the Emperor (*S. carpini*), and the Pale Tussoch (*O. pudibunda*). Possibly, some contrivance might be resorted to which would obviate this; such as lining the pot with paper, or some other material which caterpillars could easily fix themselves upon, and which would not chill them, yet still keep the leaves sufficiently cool. I have known some young larvæ to be fed successfully for weeks shut up in glass tubes corked at both ends, or in bottles with widish mouths. The plants will need to be renewed occasionally—more frequently, of course, than if placed with their stems in water, according to another plan sometimes pursued. But, by this "bottling-up" method, the tendency of many small larvæ to wander from their food may be overcome: as they grow larger, an atmosphere thus confined seems prejudicial to them.—*J. R. S. C.*

BOTANY.

Collection Catalogues.—I have experienced the difficulties pointed out by Mr. F. T. Mott, in a collection catalogue, and perhaps the plan that I now pursue may suggest one still better. It is not long since I commenced an herbarium, and I have only used Mr. Harting's catalogue since the summer of 1868. First, I thought of confining my collection to British plants, and in order to number and arrange these, I took Hooker and Arnott's "British Flora," and numbered consecutively every species in the book. In my catalogue I put this number opposite the specimen collected. As, however, I afterwards concluded to preserve plants from any part of the world, and also, where specimens were not attainable, to introduce pictures—which in many cases, especially with orchids, convey a better idea of the plants than dried specimens—it became necessary to alter the plan of my catalogue; but I retained the same principle, simply putting Hooker and Arnott on one side, and using Lindley's "Vegetable Kingdom" in its place. The only number I use at present is the number of the natural order in that work. I allow a cover to each genus. On the cover I write the number, and the name of the order, and under that the sub-order, tribe, &c., with the name of the genus at the left-hand corner. The name of every genus only is indexed, and all the pages of the catalogue in which it is to be found are annexed. As to the pictures, I write them in red ink, and if several of one order come in at once, they may for present convenience be arranged alphabetically; as, LII. Batemannia, Catasetum, &c.; Dendrobium, &c.; Eucyclia, &c. Everything is entered in the catalogue when it enters the herbarium, and not before, and as each addition is made the index is entered up. I can lay my hand on any specimen that is put by, in two or three minutes; the others will not be of much practical use until they are arranged. I have about 2,000 of the former, and a few hundreds (three or four) of the latter. When the catalogue is full, there will be some difficulty in the second volume. I shall then have a separate index, and arrange the first one in it alphabetically, as far as it goes with the reference (Vol. I.), and go on with further additions as before. My catalogue has 300 pages, and is a convenient size. I think the index (with 112 lines under each letter) will prove to be rather small under some letters, for I have already only ten lines left under C, though the only genus I have under Y is Yucca: but so far, Mr. Harting's catalogue has answered my purpose very well.—*R. H. A.*

British Gentianaceæ.—In the *Journal of Botany* for June, Mr. James Britten, F.L.S., has an interesting paper on the various species of the above group, in which he has collected and arranged a good deal of valuable material from fugitive and other sources. He expresses his opinion that *Gentiana Amarella* is not specifically distinct from *G. Germanica*, a chain of intermediate varieties connecting them. *Gentiana Pneumonanthe* is described as still growing in the locality where it was long ago discovered,—Nettleton Moor, near Caistor, Lincolnshire. This rare plant is tolerably common on St. Faith's Bogs, near Norwich.

GEOLOGY.

Glaciers in the Rocky Mountains.—Mr. R. Bliss writes that last summer he and another American geologist obtained ample evidence of the former existence of glaciers in the Rocky Mountains, and of some of the valleys having been filled with ice. The rocks were polished, striated, and furrowed. Their glaciation was traced to a height of more than eight hundred feet. It was previously thought that these mountains did not include any evidence of glaciation.

A Fossil Bird of Prey.—The remains of an extinct and gigantic bird of prey have been discovered in South Island, New Zealand, associated with those of *Dinornis*. It most nearly resembles the New Zealand Harrier (*Circus assimilis*). Dr. Haast states it to have been twice the size of the Great Wedge-tailed Eagle of Australia (*Aquila audax*), and belonged to the genus *Harpagornis*. This huge raptorial is supposed to have preyed upon the young or feeble individuals of the extinct *Dinornis*.

The Stone Age in New Jersey.—The two profusely illustrated articles which appeared in the

American Naturalist under the above head, from the pen of Dr. Abbott, have been reprinted. Dr. Abbott has classified the various implements found in his neighbourhood, and compared them with those published in Nilsson's "Stone Age." One peculiar feature about them is that they are mostly composed of material not found in the district. The pamphlet is ably and clearly written, and indicates extended and careful observation.

The Geology of Ohio.—The State of Ohio has just pnblished a handsome volume, abundantly illustrated with maps, sections, &c., of the Geological Report of the State for 1870. The Introduction, by Professor Newberry, chief geologist, is of a very interesting character. The entire survey, stratigraphical as well as palæontological, seems to have been most exhaustively carried out. Other reports are to follow this, of a more detailed and elaborate character. Among other incidents, Professor Newberry mentions the finding of a large boulder of quartzite, half imbedded in the coal at Nelsonville. Evidently this stone had settled into the coal whilst it was in a comparatively soft state; but how it got there is a puzzle. The professor thinks it probable that shore ice may occasionally have formed, and thus the boulder might have been brought. Is it not more probable, considering the general character of the carboniferous vegetation, that this stone might have been entangled among the roots of a drifting tree, which, when stranded and decomposed, left it *in situ* among the coal, of which it has since formed a part?

Deep-sea Corals.—Count Pourtales has just described the deep-sea corals, &c., collected during his recent expeditions. The most interesting of these is the *Haplophyllia paradoxa*, dredged off Bahia Honda, at the depth of nearly two thousand feet. It is referred to the *Rugose* corals, which have hitherto been confined to strata below the coal-measures. The nearest allied form to it is a fossil species in the Permian, *Calophyllum profundum*. The species, therefore, is of great antiquity, and may be regarded as a belated form, analogous to the *Trigonia*, still living in Australian seas. It is a significant fact that nearly all the rare species allied to extinct forms inhabit the deeper parts of the sea-bed.

NOTES AND QUERIES.

Lunar Influences.—Get *Lardner's Museum of Science and Art*, No. 2, price fivepence, and you will find there a very interesting note on supposed lunar influence in cases of mental derangement. Dr. Lardner, however, while giving the popular notions and opinions of others on the subject of lunar influences in this and in other matters, clearly thinks that few have *fact* for a foundation. Hippocrates and Galen believed firmly in the influence of the moon; they said that the critical days in various diseases corresponded with the intervals between the moon's chief phases; namely, the 7th, 14th, and 21st of the sickness. Lunar eclipses always made Bacon faint, but he was no lunatic; and Gall states that he has observed patients who were of weak intellect peculiarly excited at full and new moon. Should "R. P. U." fail to obtain the little work I have mentioned (as I see it was published in 1854), I will, with pleasure, lend him the book.—*H. E. Watney.*

Canine Gyrations.—I heard a few years ago a solution given to the question alluded to by Mr. C. F. White. It was during a course of lectures on science delivered by Mr. G. D. Wood, of Queen's College, London. He remarked that the gyrations made by the cat and dog were part of their natural hereditary instinct, which cannot be eradicated. Wild animals of the feline tribes, when in a wild state, sleep in a sort of lair or bed, which they make for themselves, among tall grass, weeds, rushes, &c., and which is formed by these gyrations, the animals turning themselves round and round, not to find the head of the bed, but in order to prepare a bed where to lay their heads.—*Barbara Wallace Fyfe, Nottingham.*

The Liver.—In this locality (Langport, Somerset) a large portion of the moors through which the Parrett runs abounds with the Yellow Iris (*Psued-Acorus*). These plants are commonly called by the "natives" *livers,* and the land where they grow is designated *liver-ground.* Was not *Liverpool*, then, a tract of marshy ground in which these *livers* flourished and on the margin of which the germ of the now mighty commercial giant first took root?—*W. B. Paul.*

Wasps' Nest.—Can any of your readers give me a receipt for preserving a wasps' nest, which was taken in a bush? I have had it some time, in the hope that the smell would go off by the young larvæ drying up; but such does not seem to be the case. I should be glad to know of an effectual cure for it.—*J.L.C.*

Nemertes.—Will you allow me to ask in your magazine some questions respecting a "Nemertes" fished up at Hunstanton some days ago? It came up in a trawl-net from about three fathoms' depth, and when first seen was *knotted* up round a bit of sponge. We put him on the deck, and he then unwound his coils to a length of three feet each. There appeared to be five or six of these slender snake-like feelers. Their colour was a deep brown, almost black, and velvet to the touch, and their diameter did not exceed one-eighth of an inch. We kept this Nemertes on shore in a bucket of sea-water, while we searched for a description of him; but were obliged to throw him away next morning. We could find no description of any nemertes possessing different feelers; and I therefore venture to trouble you with these questions. —*Fred. Cresswell.*

Saffron.—Allow me to take exception to two paragraphs in Mrs. H. E. Watney's learned disquisition on Saffron at p. 107, Science-Gossip, for May. First, Mrs. Watney tells her readers that "English saffron is considered the best. The Spanish *Azafran* is dipped in oil to preserve it, and this is supposed to take from its value." The truth is, that English saffron is now seldom or never seen, and as a commercial article Spanish saffron, or *Azafran*, if Mrs. Watney prefers it, is generally regarded as the best kind: though it might at one time have been dipped in oil, such is not the practice now. Next in quality to the Spanish comes French, and then Italian. A reference to p. 349 of Lindley and Moore's "Treasury of Botany," or p. 444 of Bentley and Redwood's new edition of "Pereira," will confirm these statements. The next paragraph of Mrs. Watney's I have to deal with runs as follows—"The Meadow Saffron is a different plant; from it colchicum is produced; and we likewise have an early purple crocus, the *C. Vernus*, or spring crocus; but neither of the latter possess any medicinal virtues, I believe." The colchicum produced from the Meadow Saffron, which is the *Colchicum autumnale*, L., does *really* possess medicinal virtues; it is an article well known to every medical man, and is given in different forms, in rheumatism, dropsy, &c. Wine of colchicum is a popular specific in gout. In point of medicinal value the *Colchicum* is a more important plant than the *Crocus*.—*John R. Jackson, Kew.*

The Saffron.—I am much obliged to both your correspondents "H. B." and J. W. White, for drawing my attention to an error which appeared in my notice of this plant published in the May number of Science-Gossip. I seldom read my effusions *in print*. I ought to do so when proofs are not furnished, and critics, who have drunk "deeply" of the "Pierian spring," on the alert. I also know that I am a careless writer, and that the best of P. D.'s is not infallible. I believe I wrote, or at any rate I intended to do so,—"There are three species of crocus besides the saffron crocus,—the naked-flowering, the lesser, and the spring crocus; neither of which possess any medicinal virtues." The *C. nudiflorus*, or naked-flowering crocus, produces its bloom before the leaves. Mr. White probably alludes to this species. "H. B." asks, "What is colchicum?" As I have sent up a notice of the plant from which it is extracted, I will only subscribe myself,—*H. E. Watney.*

Tufted Duck.—I should doubt the bird described by "G. E. R." being a Tufted Duck, or, at least, a sure bred one in any state of plumage. I infer from its having a crest that it was a drake. —*G.*

Pigeons.—Can any of your correspondents inform me if it is a common circumstance for two birds to be hatched from one egg? I have a pair of Beards so hatched. They are both healthy and alive.—*Columba.*

Chemical Properties of Fungi.—What are the chemical properties of the fungi which cause the luxuriant growth of grasses on the fairy rings? Does the manuring property arise from the decomposition of full-grown fungi, or is it attracted from the atmosphere or soil by the spawn?—*H. W. D.*

Sugaring.—Reading the article on moth-collecting by Dr. Knaggs reminded me of my old plan of boxing insects after sugaring. I carry a number of "Vesuvian" boxes, and when the insect is quietly settled, I place over it the half-open drawer, and sliding it in, capture my prize without risk from handling, or any necessity for a net. I also use a small, flat, dark lantern, fixed by a leather strap round the waist, which arrangement leaves the hands at perfect liberty.—*W. G.*

The "Game Cock."—Is the "Game Cock," now happily scarce, merely a variety of the genus "Gallus," handed down to us, unmixed, from remote antiquity? Or is it, as I have been told by one who speaks, as he says, from personal knowledge, a cross between the cock pheasant and the farm-yard hen? —*J. W. B.*

Natural History Guide to Scarborough.—It may be of interest to some few readers of Science-Gossip, who may perchance visit Scarborough, to know that there is a guide to that place containing a list of the local fauna and flora of the neighbourhood, and also the precise spots where they occur. These lists have been compiled by several eminent naturalists resident in the vicinity of Scarborough, and who have for some time past worked the neighbourhood with considerable patience. The botanist, zoologist, entomologist, and geologist will find this book a most valuable assistance in their pursuits whilst sojourning there. The publisher is S. W. Theakston, of Scarborough. —*H. A. Auld.*

A Microscopical Difficulty.—Believing that a record of failures is sometimes as useful as a notice of success, I wish to mention a difficulty I have long experienced in the preparation of a certain class of microscopic objects, and to request the advice of some of your more experienced correspondents in suggesting a remedy. I have long taken much interest in the preparation and mounting of the various spiculæ found in the skins of British and foreign Synaptæ, Holothuriæ, and Chirodotæ, as well as those of Gorgoniæ; but hitherto without the invariable success I hoped for. The difficulty has been, how to remove the soft parts completely without destroying the calcareous spiculæ. I have tried liquor potassæ pure, and in almost every degree of dilution; but the result has been that, after a time, a portion of the fleshy substance becomes insoluble, or is converted into a sticky substance, like birdlime; on further boiling to remove this, the spiculæ begin to corrode, and after a time disappear altogether. Thinking that the previous preservation of some of these specimens in spirit may have hardened the skins, I have tried previous maceration in pure water, but without success. In the cases where I had mounted some that were clean and very carefully and well washed, they remained perfect for some years, but ultimately the same corroding process began to show itself, although I had no reason to suppose there was any fault in the Canada balsam. I should, however, observe that some prepared apparently in the same way ten years ago remain as good as ever, though I really cannot say why; showing that my failure is not an unavoidable one. I shall feel extremely obliged for any suggestions that your correspondents may kindly offer.—*R. Battersby.*

How to Kill Moths.—I see in your May number of Science-Gossip a request for some receipt for destroying moths. I have one, which has kept them off for about thirty years. I believe it never fails *to keep off* moths, but am not *sure* it will *destroy* them. Spirits of wine, ¾ pint; spirit of turpentine, ¾ pint; camphor, 3 oz., to be shaken before using, and kept in a stone bottle. The woollen clothes or furs to be wrapped in linen, and crumpled-up pieces of blotting-paper, dipped in the liquid, to be placed in the box with them, so that it smells strongly. This requires renewing about once a year. —*Margaret Lowe.*

Gold fish.—There being a considerable sale of these fish here, and consequently a system of rearing I find from inquiry that the difficulty experienced by "T.D.," from the cannibalism of the seniors, is thus obviated:—On the surface of the water lay a trellis-work of reeds, upon which place a sufficient quantity of fine grass taken from a pond or river-bank, to protrude about two inches below. The spawn will adhere to this, and must be removed by lifting the frame, and gently shaking it over the top of another receptacle, where they are hatched and kept till strong enough to fight their own battles. Should no grass be obtainable, carefully pulled tow can be used.—*F. B. B., Malta.*

Marine Aquaria (p. 112).—As stated in last month's Science-Gossip, a marine aquarium is to be established in Manchester. It will be very similar to the one at the Crystal Palace, but with such improvements as experience has shown to be advisable. The building will measure 120 ft. by 70 ft., and will be divided into three; viz., two side galleries, each 120 ft. by 15 ft., and a grand saloon 120 ft. by 40 ft. There will be about forty tanks in each side gallery, ranging in capacity from 300 to 3,000 gallons, whilst the grand saloon will contain two tanks—the largest yet constructed,—each 30 ft. by 10 ft. by 8 ft., capable of containing 15,000 gallons apiece. In the grand saloon also will be the tidal tanks, which will vary in capacity from 20 to 200 gallons. Lastly there will be table aquaria provided for the smaller inhabitants of our ponds, ditches, and streams, and an ever-flowing fountain, or miniature lake, for the larger.—*G. H. H.*

The Parrot a Cuckoo.—Last spring our grey parrot was hung up in his cage outside the kitchen-door. He hung among shrubs that grew near the woods where the cuckoos were calling all day long. Of course the parrot learnt to imitate the sound, and his "cuckoo" was as perfect as possible. When the summer was over, Polly ceased to cuckoo, and seemed entirely to have forgotten her accomplishment. One day last February she was hung out in the sun; no cuckoos had arrived as yet to remind her with their voices, but she struck up cuckoo of her own accord, as if the spring and the warm sun had brought the idea back to her memory. In consequence several people mentioned as a fact that they had heard the cuckoo in February. Polly is cuckooing brilliantly now, and will evidently take up the habit regularly every spring of her own accord.—*M. A. D.*

Extraordinary Tenacity of Life in Caterpillars.—In April I had in my possession several larvæ of the Tiger-moth (*A. Caja*), which were then about half-grown. While changing their food, one of them without my perceiving him got out, and in moving about I accidentally trod upon him, forcing out the whole of the intestinal canal and digestive apparatus which runs down the centre of the body, through the anal aperture. I removed these parts and placed the caterpillar on one side in a small open box, and two days afterwards was astonished to find that it had not only crawled out of the box but a further distance of some two yards. On taking the caterpillar up I discovered it to be still alive, but died about ten hours afterwards; so that it lived some fifty-eight hours without food and without intestines.—*C. A. Ryan.*

Curiosities of Bird Life.—At the end of last March, a pair of Blackbirds built their nest in a yew-tree, and in due time reared their brood: after having turned them out on "the wide world" to do the best they could for themselves, the parent birds quietly returned to the old nest, cleaned it out, and re-lined it; the hen bird then proceeded to lay, and is again hatching. I know it is the same pair of birds, from the fact of the hen having a light-coloured breast, and white feather in her tail: this I should think is a very uncommon case. — *Ralph H. Westropp, A.B., T.C.D.*

A Microscopical Difficulty.—Having some spare time, and wishing to employ it in an intellectual manner, I some time since purchased a microscope, an excellent binocular instrument, with a complete set of object-glasses, &c., and also Carpenter, the Micrographic Dictionary, and several other books, intending to devote an evening or two a week to the study of the animal and vegetable inhabitants of the ponds in my neighbourhood, which are numerous and prolific in beautiful objects; but, at the outset, I encountered a difficulty which nearly twelve months' perseverance has not enabled me to overcome; and I am sure that some of your able correspondents, if they would give their assistance by an article or articles in Science-Gossip, would be conferring a great boon, not only upon myself, but upon hundreds of others who are similarly situated. My difficulty is this: having collected my specimens, animal or vegetable, to know how to set about examining them, and especially how to find out their names. This latter problem solved, books become really useful, but they afford little assistance in attaining this object. No doubt the best and easiest way of getting over the difficulty, would be to obtain the aid of some skilled microscopist; but I, like many other would-be naturalists, reside in a country village, far removed from the realms of Science, and where it is utterly impossible for me to obtain, even at intervals, such assistance. Under these circumstances I trust you will pardon my trespassing on your space, with the suggestion, that some of your correspondents should take up the matter in your columns.—*J. H. C.*

Golden Eagle in Somersetshire.—Mr. Gifford would add to the interest of his communication on this subject if he would kindly add some more particulars, such as the date of the capture, and a short distinctive description of the bird, especially of the feathers of the tail, and also of those of the tarsus, *if any.* This might give us some notion as to the age of the birds, whether they were merely young birds driven off by their parents, and wandering about, or adult birds about to settle in the Doone valley. The question as to the feathered tarsus would settle the question of identity, should such questions arise.—*C. S.*

The Woodpigeon's Cry.—Perhaps the following very amusing incident, with regard to the Woodpigeon's cry, may not prove uninteresting to some of your readers, whilst the facts are entirely new to all. The circumstances happened some years ago, at Narberth, S. Wales. It was nearly midnight, when a thief made his way to a farmyard, in the vicinity of the ancient town, for the purpose of helping himself to a plump sheep. He reached the yard, and was just in the act of carrying off his booty, when he thought he heard some one behind him speak in a subdued tone. He listened, and trembled; but all was still; not a sound was to be heard. But, presently, just as he was on the point of moving, he heard the supposed voice again, this time clearer, saying in lengthened sepulchral notes, "Take two sheep, Taffy!" The affrighted Taffy instantly let go his hold of the sheep, and dashed from the spot with lightning speed, imagining that a certain unmentionable personage was eyeing him. It turned out, however, to be a wood-pigeon, which uttered the cries on being disturbed by the marauder.—*G. O. Howell.*

Clips for Microscopic Objects.—Allow me to suggest, for the benefit of those of your readers who may be unable to obtain convenient clips for preparing microscopic objects, that the clips used in making neck-ties are exactly the thing wanted. They are very convenient, and occupy very little space. I constantly use them myself, and should any of your readers be unable to obtain some themselves, I will forward any number on receipt of value. They are 1s. a dozen.—*Horace E. Browne.*

Field Clubs.—Could you, or any of your correspondents, tell me of a field or microscopical club near Clapton or Dalston? I have written to three mentioned in your columns, but they are closed. Might I suggest that when clubs are thus brought before the public their secretaries should take the same means of notifying their closings? It would save much time.—*J. R. Davies.*

Age of Ferns.—I do not remember having seen mention made of the age of ferns. *Filix mas* seems to live long, for I have many specimens that were planted twenty-one years ago, when they had already attained a respectable size. They were planted in deep peat, but have had to contend with those adverse influences which render gardening difficult in a garden at the back of one of the houses in Grosvenor Street; and, nevertheless, they have again brought forth their ten or twelve vigorous fronds, and seem inclined to do so for many years to come.—*E. J. T.*

The Cuckoo.—A wish is expressed by the writer of the article on the Cuckoo in the May number that any one would assist him by communicating their observations on the Cuckoo's habits; and as it so happened that a few years ago a cuckoo deposited its egg in a hedgesparrow's nest in some ivy against my garden-wall, I had the pleasure of daily watching the growth and peculiar habits of the young bird, and I was especially struck by the fact, that the whole time it was under the fostering care of the hedgesparrows, an old cuckoo frequented the trees in the immediate locality of the nest, apparently signifying by its call its own knowledge of the young one's whereabouts, and a natural interest in its welfare. I discovered the young bird shortly after it was hatched, and, before it could fly, I frequently took it out of its nest, and showed it to my friends. When it became too big for the nest, but still unable to fly, it got out of the nest, and roosted in the currant or gooseberry bushes in the garden. This continued for, I suppose, nearly three weeks or more; and, even after it could fly tolerably well, it would allow me to catch it; and it was especially amusing to see the little hedgesparrow feeding the cuckoo, so much larger than itself. During the whole of this time, I have no doubt it was the parent bird which frequented the spot, for shortly after the young one became fully fledged and well able to fly, both it and the others disappeared together; thus confirming your correspondent's and my own ideas that the Cuckoo is not so unnatural a parent as is generally supposed.—*C. A. Rowley.*

Passiflora cærulea.—It is a mistake to say that this plant was not introduced till 1699. It is figured and described as a well-known plant cultivated in England, both by suckers and seeds, in Parkinson's *Paradisus in Sole*, 1629. He likewise gives a figure of it as falsely depicted by the Jesuits, showing plainly the instruments of the Crucifixion, and has some very amusing observations on their misrepresentations, which he compares with a correct figure of the plant. It is also figured and described in Johnson's addition to *Gerarde* (1636). I am aware that Loudon gives the date 1699 as that of its introduction, but it is certainly an error. —*Eden Warwick.*

How to Destroy Clothes Moths.—In reply to "W. M. M.," it may be stated that the eradication of these insects is confessedly a matter of difficulty. The moths, as "W. M. M." is probably aware, are not the real offenders, that is to say, they do not actually cause the damage, though injurious, as they are the parents of the destructive larvæ and to kill them, or prevent them from depositing their eggs, is important. Camphor and benzole are of service; also sulphur; but these things must be used in a confined space, since their odours, if diluted with air, will only stupefy, and the moths revive again. The larvæ defy any applications of this sort, though it is possible the fumes of strong tobacco, being dense, might kill, if brought into close contact with them. *Baking* the garments, could that be done, would prove destructive to the insects in all their stages.—*J. R. S. C.*

What's the Use of Saffron to Cage Birds? —Mrs. Watney's article upon this plant of many memories suggests to me to put into print a question which has often occurred to me. There is a very general belief amongst bird-fanciers, as well as that numerous portion of the public who keep a solitary caged bird, that saffron infused in the water given to the bird at the time of moulting (or even at other times when a bird is "out of sorts"), is of particular benefit. I have followed the popular idea, and often thus administered it, but very much incline to the opinion that it is inefficacious. If it acts at all, the effect must certainly be produced on the homœopathic principle, since the saffron itself will not be touched by the bird, and the amount of soluble matter imparted to the water by the few blades of saffron added to the water must be small indeed. The action, if any, must be stimulating, as it is thus noticed to influence the human subject; but then it needs to be given in considerable quantity. A good deal of the saffron sold, however, is partially exhausted, both of its colouring and active principle, ere it gets into the market.— *J. R. S. C.*

A Nest in a Cabbage.—A few days ago I saw, in a neighbour's garden, a hedgesparrow's nest built amongst the flowering branches of a large "curled green." The nest was placed on the end of the stalk, where the top had been cut off, so that there was very little or no shelter above; and a heavy thunder-shower had drowned the young birds. I do not think I ever saw a bird's nest in a cabbage before.—*Robert Holland.*

Stickleback.—When passing by a stream last month, a small fish attracted my attention. On taking it up, I found it to be a stickleback (*Gasterosteus aculeatus*, Linn.), but round the lower half of its body were a quantity of small fine hairs of a whitish colour. I took it home and kept it in water, but it only lived three days. The hairs increased in quantity and length so much, that by the time it died its body was completely covered. There was another in a similar state. Can any of your readers give me an explanation of this?—*C. L. W.*

Montagu's Harrier.—On the 15th of May my friend F. Brent, Esq., of Plymouth, kindly presented me with a fine old male Montagu's Harrier (*Circus Montagui*), in the flesh, which he had purchased of the warrener at Trowlsworthy, on Dartmoor. In its crop and stomach I found no less than fourteen lizards, all six inches in length, and nearly perfect, with the exception of the brittle tails of some, which had come off, but were still lying by the sides of the reptiles in the stomach of the bird. There were also the remains of many others. How exceedingly quick the sight and actions of the Harrier must be in capturing so many of these agile creatures, for we are all familiar with the rapid movements of the lizard, which instantly vanishes on the slightest alarm. Young or immature specimens of Montagu's Harrier in their brown plumage are occasionally met with in Devonshire; but one in the ash-grey of maturity is rarely seen, and, but for the discernment of Mr. Brent, this fine specimen would doubtless have been entirely lost, or have shared the ignominious fate of many other (rapacious) ornithologieal rarities, by being nailed on door or wall.—*J. Gatcombe.*

Yellow-hammer (*Emberiza citrinella*).—Is it usual for the Yellow-hammer to build on spruce fir, as I have this season found three nests of these birds upon one tree, from four to six feet from the ground; and all of these nests were within a very short distance from each other? When I found the first nest it had no eggs in it. I then commenced to examine it, and found it to be built of the same materials as the Yellow-hammer's. I was surprised at this, for I never thought of this bird being in this situation; and I expressed my surprise to my son. I went on farther, and found the second one, and it was without eggs also. The nest was of the same construction as the first; I had no further evidence of it being this bird's. I still went a little farther, and found the third of these nests, which had three eggs in it. I then had no further doubt about their being the Yellow-hammer's.—*J. Taylor.*

Tawny Owl (*Syrnium Aluco*).—On April 25th, an acquaintance passing by showed me a young owl of this species, which had just been procured from a hollow tree in Kingston Park. It was a most funny little bird, nearly full-feathered, the brown limbs of the adult plumage appearing here and there. His head was a mass of soft downy feathers, and his legs neatly covered with a pair of very respectable stockings, warm and comfortable, except a bare patch high up the leg, worn off by the friction of resting on that part. This little owl, though in juvenile attire, had an air of wisdom far beyond his years (or weeks), and his look of settled melancholy was enough to make a person decidedly uncomfortable. One would imagine, to look at his severe, grave, and misanthropical physiognomy, that the weight of centuries had rested on his head, and that his share of the trials and troubles of the world had been by no means unlimited. He was discovered in broad day perched bolt-upright at the entrance of the hole, and taking a few winks of the "balmy." A tap on the trunk, and the large goggle-eyes opened in that methodical way known to the owners of wax dolls, and the hitherto unknown object developed into a baby-owl. A ladder was procured, his capture effected, and an inspection of his domicile led to the discovery of a good-sized rabbit, provided no doubt by his thoughtful parents for their darling's dinner. The little owl is now kept in an out-house and regaled with callow birds, preparatory to doing duty as a feathered policeman or beadle in a gentleman's garden. Query—Is not the above date somewhat early for young owls, or at least for such a fully-developed specimen as this was?—*W. H. Warner, Kingston.*

A Shower of Frogs.—I quote the following from "The Life of Thomas Cooper," written by himself (pages 20-1). I know my noble old friend—the author of the "Purgatory of Suicides"—too well to believe for a moment in the possibility of a mistake on his part in this matter. "The ride in the carrier's cart, too, between Rasen and Gainsborough, had its delights. One time, we set off from Rasen late at night, and drew up in an open field, sometime before the morning broke, to let the horses graze a little. I have a most lively recollection of awaking in the cart, and looking out in amazement at what seemed to be hundreds of small, dull, strange-looking lights, scattered over the wide field. My uncle told me they were glowworms; and he had never seen so many together before. Nor have I ever had such a vision of wonder as that, since boyhood. * * * * * My mention of the strange vision of the field of glowworms reminds me of another natural phenomenon I witnessed when a boy. *I saw a shower of live frogs.* I record this, because I have read, not only in that beautiful old book of Ray's, "The Wisdom of God in the Creation," but in later books affecting great fidelity to facts in science, that such a sight is impossible. I am as sure of what I relate as I am of my own existence. The minute frogs, jumping alive, fell on the pavement at our feet, and came tumbling down the spouts from the tiles of the houses into the water-tubs." The italics are Mr. Cooper's own. The date would be fifty-five years ago, or more.—*W., Oxford.*

Irritating Effects of Caterpillar's Hairs.—These being very sharp-pointed, enter the skin, and act like little thorns. The number produces a very unpleasant effect, and the more so the *thinner* the skin. They are quite as bad as cowage, and the hairs on the leaves of the red dogwood are as bad as either, but a little oil rubbed on the skin will usually set all right.—*E. T. S.*

Birds Eating their Eggs.—Some time ago I was asked a similar question about hens. They use their egg shells and the small bits of skin adhering to them to feed their newly-hatched chickens, and I expect other birds do the same. The lime in the shell helps to strengthen the bones of the chick.—*E. T. S.*

Lesser Pettychap (p. 143).—Your correspondent "G.," while endeavouring to set others right, is himself wrong. *S. rufa* is the name given to the bird by continental authors, while *S. hippolais* is retained by British authors. "G." is also wrong in saying that it may not be generally known that the Lesser Pettychap is the same as the Chiffchaff; all the works I possess giving both names.—*W. H. Warner, Kingston.*

NOTICES TO CORRESPONDENTS.

All communications relative to advertisements, post-office orders, and orders for the supply of this Journal, should be addressed to the Publisher. All contributions, books, and pamphlets for the Editor should be sent to 192, Piccadilly, London, W. To avoid disappointment, contributions should not be received later than the 15th of each month. *No notice whatever can be taken of communications which do not contain the name and address of the writer,* not necessarily for publication, if desired to be withheld. We do not undertake to answer any queries not specially connected with Natural History, in accordance with our acceptance of that term; nor can we answer queries which might be solved by the correspondent by an appeal to any elementary book on the subject.

J. W. H.—The pretty flowers sent are those of the "Milkwort" (*Polygala vulgaris*), pink and blue varieties.

F. G., Norwich.—Your query is difficult to answer, but on the whole it is possible that the Chaffinch, having a more general distribution, is more numerous than the House Sparrow; that is, taking the country through.

L. T.—You are quite right,—the moss is *Pottia truncata*.

F. C.—See last number of Science-Gossip, Dr. Knaggs's article on "Collecting and Preserving." The larvæ in public collections are preserved by professionals, who keep their mode of working as secret as possible.—C. G. B.

H. M. J. H.—A first-class work on British Diptera (illustrated) is that by Mr. Francis Walker, F.L.S., published by Reeve, Covent Garden.

A New Subscriber, Torquay.—Your query respecting storm-glasses should have been sent to some publication devoted to physical rather than to natural science; but we will endeavour to answer it. The instruments usually sold are closed at the top, and have a brass cap cemented over them. We have made them of Eau-de-Cologne bottles, and after filling, simply corking them. We never heard of any opening being left; in fact, if there were, the fluid would quickly evaporate. They, as you are probably aware, are perfectly useless as indicators of the weather, and the crystalline changes that take place are most probably due to changes of temperature. If you push the cork a little way into the tube and pour a little asphalt varnish on the top of it, you will find it will seal up the opening effectually.

H. G. Wise.—We cannot without seeing the instrument assign a reason for the imperfect illumination of the field in your binocular. Try a piece of fine ground glass between the object-slide and the condenser; this will diffuse the light and very materially add to the stereoscopic effect. Our instrument performs well even with as high an objective as a $\frac{1}{6}$ when the ground glass has a strong pencil of light condensed on the under surface.

J. G., jun., Londonderry.—Colloid Silica can be obtained by dialysing a preparation of silicate of soda (which may be procured at most chemists). This is decomposed by hydrochloric acid, and the liquid is placed in a dialyser, and the dialyser placed in pure water. After the lapse of a short time the crystalline material passes through it, leaving the colloid si ica bel.ind. A di lyser resembles a little tambourine, and is made of a ring of gutta-percha, over which is stretched parchment-paper (writing-paper will do). The dialyser is floated in a vessel containing distilled water.—F. K.

Diatom.—We think A. would suit you best.

A Subscriber, Ashburton.—Immersion lenses are made on a principle devised by Amici, which was adopted by Hartnach and Nachet of Paris, and several of the American opticians, but did not find favour here until the last few years, when the advantages of objectives constructed on the immersion principle began to be recognized. An immersion lens is so called from the circumstance of a drop of water being placed between the front lens and the object itself, on the thin covering glass, so that the rays leaving it pass through a film of water instead of air. It is well known that the loss of light from the reflection of oblique rays from a surface of glass is much less when they pass from water into glass than from air into glass. Immersion objectives require special corrections for the purpose, and are useless if used as an ordinary dry lens. Our leading opticians are therefore adapting an extra front combination to the ordinary high power, by means of which they can be used either as wet or dry lenses. Several papers on the construction and advantages of immersion lenses will be found in the *Monthly Mic. Jour.*—F. K.

H. H., Leeds.—The Water-beetle is *Hydroporus depressus*, recently out of pupa. Your specimens were smashed. They ought to have been enclosed in a cork cell, or in a quill or small box.

J. S. D.—Instruments, &c., for egg-blowing may, we should think, be obtained at any first-class philosophical instrument maker's, &c.

G. B.—The plant sent is *Neottia nidus-avis*.

A. A. C.—We cannot tell what is the best food for birds in aviaries, unless we first know what kind of birds are kept.

F. F. M.—Specimens mislaid. Numbers 1 and 2 are difficult to determine. They are the midribs of sea-weeds; but we cannot tell the species. Number 3 is a zoophyte, *Membranipora pilosa*.

John Le Bas.—The specimens were not exuviæ of fishes, or anything organic. No organic remains whatever are found in mica-schist. The specimens seem to us to be decomposed felspar, with a proportion of iron.

A Working Man.—You had better ask us some definite question in our "Notes and Queries," and you will have no difficulty in obtaining an answer.

Z. E. G.—Your mosses were named in last month's issue.

J. C. K.—The specimens attached to the Clematis branch are not cocoons, but the female of a species of *Coccus*, or "Scale insect," which has been introduced into this country. Like the Cochineal insect, the body of the female becomes the shelter for the young, the mother dying to provide them with this protection. The eggs may be seen underneath the scale.

Thomas Romans.—The fungus on the leaves of Ragwort is an *Æcidium*. See Cooke's "Microscopic Fungi," coloured illustrations. London: Hardwicke, 192, Piccadilly.

Anonymous.—We beg to draw the attention of several of our correspondents to our rule of not answering questions unless accompanied by the real name and address.

EXCHANGES.

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

Strombus, Cypræa, and other foreign shells, for British Marine shells.—A. W. Langdon, Llanrwst House, Hastings.

Living *Dytiscus* or *Colymbetes* offered for slide of clean diatoms.—H. E. Freeman, 1, Rose Villas, Wood Green.

For palate of *Cyclostoma elegans* send stamped and directed envelope to J. H. Martin, 86, Week Street, Maidstone.

Eggs of Red-footed Falcon, Grasshopper Warbler, Scoter, Crested Grebe, Eared Grebe, Sclavonian Grebe, Pintail, Long-tail, Scaup, and Eider Ducks, Sandwich Tern, &c., for others. T. H. Phuler, Vale Royal, Northwich, Cheshire.

A well-mounted Tongue of Bee, for Diatoms from Guano, mounted and named.—H. B. Thomas, 13, Market-place, Boston.

Will A. C. A., Post Office, Staines, kindly send a list of his duplicate eggs to T. H. Phuler, Vale Royal, Northwich, Cheshire?

For *Flustra foliacea* send stamped directed envelope to P. Smith, Legh Street, Warrington.

For *Gemellaria loriculata* send stamped envelope and object to Miss E. de B. Meyrick, Downshire Lodge, Blessington, Co. Wicklow, Ireland.

Cyclostoma *elegans* and *Helix Pomatia* in exchange for other English shells.—B. F. Buxton, Easneye, Ware.

For exchange or otherwise, an excellent English $\frac{1}{8}$-in. object-glass of 120 degrees angular aperture, in perfect condition.—Apply to the Rev. J. Bramhall, St. John's Vicarage, near Lynn, Norfolk.

Vallisneria, Frog-bit, *Lemna trisulca*, *Drosera*, Chelifers or Petrobii, for marine or fossil diatom material.—J. G. R. Powell, Matlock Bridge.

BOOKS RECEIVED.

"The Stone Age in New Jersey." By C. C. Abbott, M.D.

"Report of the Entomological Society of the Province of Ontario" for 1871.

"The American Naturalist," May.

"Hypotheses." By F. J. Finois.

"The Canadian Entomologist." No. 5.

"Land and Water."

"Les Mondes."

"The Insect World." By Louis Figuier. New Edition, revised. London: Cassell, Petter, and Galpin.

"Transactions of the Norfolk and Norwich Naturalist's Society," 1871-72.

Communications Received from F. K.—F. P.—C. J. L.—J. H. G. (M.D.)—G. E. X.—T. S.—W. H. P.—T. L.—S. A. B.—W. E. S.—T. C. O.—W. H. G.—J. G. R. P.—J. B.—A. W. L.—J. H. M.—H. E. F.—W. S.—T. H. P.—H. B. T.—E. D. B. M.—B. F. B.—R. H. A.—Dr. H. F. P.—J. R. D.—E. J. T.—C. A. R.—E. W.—J. R. S. C.—C. L. W.—R. H.—J. G.—J. T.—H.—Dr. C. C. A.—J. D. L. T.—J. R. J.—F. B. B.—G. H. H.—M. A. D.—C. A. R.—R. H. W.—J. H. C. C. S.—G. O. H.—H. E. B.

COLLECTING AND PRESERVING.

No. VII.—SEAWEEDS.

By W. H. Grattann.

In a former article published in Science-Gossip a few years ago, I gave some directions for collecting and preserving Marine Algæ, or seaweeds, and although, I think, it would be difficult to simplify those directions, or even to add much that would be really serviceable to young beginners in this delightful pursuit, it is my intention, in going over the ground once more, to be as explicit as I possibly can; and here, on the threshold of the subject, I have a few words to say to one or two occasional contributors to this journal, who, in calling attention to the beauty of marine vegetation, and urging young persons to collect and preserve Algæ, have advised them to ignore books on the subject, and to go to the shore, use their own eyes, and collect for themselves, &c. I am sorry very greatly to differ with such advice. Collecting in this way may be amusing enough to those who care not for science, but when it leads to parcels of seaweeds, picked up at random, being sent to botanists with a request that the names of such plants should be sent to the writer, it is the reverse of pleasure to the scientific botanist, for it gives him infinite trouble, and enables him to convey but very imperfect information to his applicant. The editor of this journal has often been thus appealed to, and packages of decayed rubbish have frequently been sent to me for examination, containing species, or rather fragments of plants, which for the most part, were utterly worthless and defied identification.

Almost all collectors commence by mounting plants which a little experience proves to be really what the old poet termed "*alga projecta vilior*"; but as seaweed-gathering, like everything else, requires practice, beginners must not be disappointed because they do not find rarities or fine specimens whenever and wherever they may seek for them.

When I think of the difficulties I experienced at the outset of my study of marine botany, especially in the collecting and drying of seaweeds, I feel strongly inclined to urge all beginners to obtain some information concerning Marine Algæ before they go to the shore to collect for themselves. A very few hours of study with an experienced algologist, or even a perusal of some illustrated work on British algæ, will save much trouble and materially assist the unpractised eye in selecting specimens for the herbarium. I may here mention as highly useful to incipient algologists Dr. Landsborough's "British Seaweeds," and Professor Harvey's "Manual," either of which may be obtained for a few shillings; but if my readers are resident in London, I advise them to pay a few visits to the Library of the British Museum, and there inspect Dr. Harvey's "Phycologia Britannica." In this magnificent work they will find coloured figures of nearly every British seaweed, with drawings from magnified portions, and various structural details of the highest value to students; and I once more impress on all collectors the importance of some degree of book-learning ere they sally forth, bag or vasculum in hand, to cull the lovely "flowers of the ocean," or gather what best may please them from the rejectamenta on the shore.

If the collector wishes to learn, not merely the *names* of plants, but to distinguish *species*, he will do well to provide himself with a copy of Harvey's little volume the "Synopsis of British Seaweeds," and a Stanhope or Coddington lens, by means of which he can examine portions of delicate plants as he finds them, and compare them with the descriptions given in the "Synopsis"; in this way, if he have any success during his excursions, he will quickly become familiar with most of the plants which are cast ashore or grow within tide-marks.

Time will not admit of, neither is space in this journal available for, a single line beyond what may be practically serviceable to my youthful readers; therefore I will hasten to describe the course of action in seaweed-collecting as I have practised it for many years. At once, then, to the shore, but not to the sandy shore, for only useless decayed rubbish, or here and there some straggling plants of *Zostera marina*, or grass-wrack, will be met with there. The collector must away to the rocks, and search carefully every pool he meets with, from a little distance below high-water mark, and so on down to the water's edge, always remembering that it is better to collect while the tide is receding than as it is coming in.

Presuming that few persons will think of collecting seaweeds much earlier than the month of May, let me observe that most of the accessible species of olive and green plants which grow on rocky shores and in tide-pools, will be found from May to June in pretty fair condition, but very few red plants, except those which grow on the shady sides of rock-pools, or under the shelter of the larger olive weeds, will be met with until a considerable space is laid bare by the receding water at the low spring tides, about a day or two before and after the full moon.

As nearly all the *rare* red weeds grow in deep water, they are seldom taken in any degree of perfection unless they are dredged; but in the summer months, say from June to the end of August, many fine plants are occasionally thrown up from deep water, and others are found growing on the stems of the great Oar-weeds, portions of which are cast ashore, beautifully fringed with one or more species of Delesseria and other rare Rhodosperms—in fact, during the rising tide, diligent collectors may secure many a lovely deep-water plant as it comes floating in, but which, if allowed to remain long exposed to the action of sunlight, will fade in colour and decompose before it can be mounted. This is especially the case with all the soft gelatinous red plants, such as the Callithamnia, and all the Gloiocladiæ, as well as a few of the softer olive weeds; and here I may observe that there is one genus of beautiful olive plants, the *Sporochnaceæ*, which must on no account be put into the vasculum with any of the delicate red plants, for they not only very rapidly decompose, but injure almost all others with which they are placed in contact. The species are not numerous, and they may be easily recognized, after having been previously studied from the coloured figures either in Harvey's "Phycologia," or in Bradbury & Evans's "Nature-printed Seaweeds." It is also a curious fact respecting this genus, that while they are all of a beautiful olive tint in the growing state, they invariably change to a fine verdigris-green in drying; and indeed this is very generally the case with the filamentous olive weeds, the Fuci, or common rock-weeds, as constantly turning quite black after mounting: whence the term, that of "Melanosperm," which is given to the subdivision to which all the olive weeds belong.

As there are so few seaweeds which have generally known common names, I shall make no apology for using the names by which they are known to Science, presuming that all intending collectors will, as I have already suggested, gain *some* knowledge of Terminology ere they go out "seaweeding."

Beginners should be cautioned against the very natural error of bringing home too many plants at a time; they must be moderate in their gatherings, or be content to risk the loss of some choice specimens, which will decompose unless they are attended to before night. The first thing to be done upon arriving at home, is to empty the collecting-bag into a white basin of sea-water, and to select the best and cleanest plants as soon as possible, giving each a good swill before placing it in another vessel of clean water, and getting rid of rejected plants at once, so that the basin first used will be available for rewashing the weeds before they are severally placed in the mounting-dish. When a day is fixed on for seaweeding, the collector should order a large bucket of clean sea-water, which, after being left to settle, should be strained through a towel, so as to be as free as possible from sand and dirt. Two or three large pie-dishes will be necessary, the deeper the better, and white, if such can be obtained. Place these on a separate table with towels under them, and reserve a table specially for the mounting-dish and the parcels of papers, calicoes, and blotting-papers. The large white bath used in photography is very well adapted for mounting seaweeds; the lip at one corner is convenient for pouring off soiled water, and its form—that of an oblong—is most suitable for receiving the papers on which the plants are to be mounted. Beside this vessel should be placed the following implements:—A porcupine-quill, two camel-hair pencils, one small, the other large and flat, a pair of strong brass forceps, a penknife, a pair of scissors, a small sponge, an ivory paper-knife, and two thin plates of perforated zinc, somewhat less in length and breadth than the inside of the mounting-dish.

Smooth drawing-paper, or fine white cartridge-paper, is generally employed for mounting. The operator should be provided with three different sizes of paper, and these should have each a piece of very fine calico and four pieces of blotting-paper to correspond. The process of mounting one of the filamentous or branching species is as follows:—The specimen being cleaned and placed in the mounting-dish, a piece of paper of suitable size is laid on one of the perforated zinc plates, and both are then slipped quickly under the floating weed. The root or base of the specimen is then pressed down on the paper with a finger of the left hand, while the right hand is employing the forceps or porcupine-quill in arranging the plant in as natural a position as possible, ere the zinc plate is gently and gradually raised at the top or bottom, as may be necessary, to insure a perfect display of every portion of the plant; but if, upon drawing it out of the water, it should present an unsightly appearance from too thick an overlapping of the branches, the whole must be re-immersed, and a little pruning of superfluous portions may be employed with advantage to the specimen and satisfaction to the operator. Care should be taken that the water be drained off the paper as completely as possible before the calico is laid over the plant, and this is accomplished by raising the paper containing the plant as it still lies on the zinc plate, and transferring it to a thin board placed in an inclined position against one of the basins, and with the large camel-hair pencil *paint* off the water as it runs away from the specimen, and absorb what remains, when the paper is laid flat, with the sponge. Delicate species may be left to drain for a few minutes, while the operator is arranging other specimens. When the water is sufficiently drained off, the paper is then laid on the blotter, and the piece of calico is placed upon the plant—a sheet of blotter being laid upon the calico.

Care should be observed in subjecting plants to pressure, which, in the first instance, should be sufficient only to help the absorption of water. The first set of blotting-papers should be changed in half an hour after the whole batch of specimens have been placed in the press, and these must be thoroughly dried before they are used again. After the second or third change of blotters, the plants should remain under strong pressure for two or three days; but the pieces of calico must not be removed until it is pretty certain that the papers and plants are quite dry.

With the exception of the Fuci or common rock-weeds, I never place seaweeds in *fresh* water: with these, especially *Fucus serratus*, *F. nodosus*, *F. vesiculosus*, and *F. canaliculatus*, a few hours' immersion in fresh water is an advantage, as it soaks the salt out of their fronds and renders them more pliable. As all the Fuci turn black in drying, and few of them adhere well to paper, I arrange my specimens in single layers between the folds of a clean dry towel, and keep them under pressure until they are quite dry; they may then be put away loosely, or gummed on sheets of paper.

The foregoing directions for mounting filamentous seaweeds are applicable to all the branching species of Olive, Red, and Green plants; but in each of the three subdivisions there are a few species which are so gelatinous,—in fact, so soft and spongy, that they require the utmost care during pressure, otherwise they adhere to the calico and break off in fragments as it is drawn away. Such plants must be left to dry in a horizontal position for an hour or so before the calico and blotters are placed over them, and pressure must be very slight until they have adhered closely to the paper. Among the Chlorosperms, or green plants, there are the various species of Codium, young plants of which only are manageable or indeed desirable. In the Melanosperms, some species of the genus *Mesogloia* will require care and patience in mounting, as well as the long string-like plant, known as *Chorda filum;* and again, the spreading tuberous mass called *Leathsia tuberiformis*, portions of which should be cut from the rock, the sand scraped and washed out, then laid on the wet paper, and allowed to shrink for some hours ere calico blotters and pressure be applied. These difficulties are much more numerous among the Rhodosperms, or red seaweeds, experience only teaching the best method of treatment. I will, however, mention the names of some very troublesome plants, the fronds of which, if subjected to pressure too soon, burst and discharge their carmine contents; not only presenting an unsightly appearance, but destroying the specimen. These are *Griffithsia corallina*, *Dudresnaia coccinea*, *Naccaria Wiggii*, all the *Chylocladia*, and the rare *Gloiosiphonia*, as well as the slimy worm-like plant known as *Nemaleon multifidum.* In addition to these troubles among the red plants, there is an opposite difficulty connected with several Rhodosperms which must be pointed out; and that is owing to an absence or scarcity of gelatine in their substance, which is in some of a stout, leathery, or horny nature, and in others is due to a coating of carbonate of lime, which completely envelops the vegetable structure. Among the former may be mentioned the several species of Phyllophora, and several among the genera Gigartina, Chondrus, and Sphærococcus; and in the latter, all the calcareous Algæ, especially the well-known *Corallina officinalis* and *Jania rubens.* All these, and several others of a membraneous nature, among the olive as well as the red weeds, must be first mounted in the ordinary manner, and when they are tolerably dry and begin to shrink away from the paper, fill the mounting-dish with stale skimmed milk; refloat the plants on their papers in the milk, and indeed go through the same process as before with the sea-water, but be careful to absorb all the milk from off the surface of the plants and the back of the papers, and then, after the usua time for drying and pressing, the most obstinate seaweed will be found adhering perfectly to the paper, and will remaiu so permanently.

One more difficulty must be referred to for the benefit of young beginners, who, in mounting some of the Laminaria and that peculiar olive weed called *Himanthalia lorea*, may wish to preserve the thick-branching roots and stems. First wash the roots as clean as possible, and then, with a sharp penknife, make a clean cutting horizontally of the whole root and some little distance up the thick round stem; then, after having removed the cut portions, place the inner surface of the root and stem on the paper, and the gelatinous matter which oozes from the plant will cause the roots to adhere firmly to the paper, and in drying, the usual olive tint of the various species of Laminaria will be finely preserved. Some botauists employ a mixture made of isinglass, dissolved in alcohol, to fix some of the horny or robust species ou paper; but if gum is made use of, it is better to employ gum tragacauth than gum-arabic, because, in drying, the former has none of that objectionable glare which is peculiar to gum-arabic.

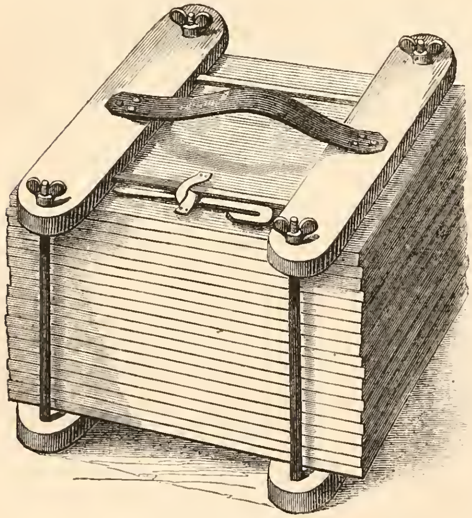

Fig. 109. Seaweed Press.

As regards the best method of pressing seaweeds, I think I can hardly do better than refer my readers to the above figure of a Seaweed Press, which I invented for myself many years ago, in which I have pressed many thousands of beautiful seaweeds. Almost any degree of pressure can be obtained in it: first, by the thumb-screws on the iron rods at each corner, and, finally, by means of the clamp which is strapped on the top of the press. Any intelligent cabinet-maker or ironmonger could provide such a press from an inspection of the figure, the cost, of course, varying with the dimensions and the number of boards.

With respect to localities favourable to seaweed-gathering, I may specially mention the south coast of Devon; from Exmouth, where *Bryopsis* and *Padina pavonia* grow in perfection, to Torquay aud the coves of Torbay, and down the coast to Plymouth, Cawsaud Bay, and finally Whitsand Bay, the "happy hunting-grounds" of the enthusiastic algologist. On the north-east coast, Filey and Whitby must be mentioned, as well as the shores upwards from Tynemouth to Whitley. Peterhead is also a good locality, the rare *Ectocarpus Mertensii*, aud *Callithamnion floccosum* being found there in abundance. Other favourable statious in Scotland, well known to me, are Lamlash Bay and Whiting Bay; nor must the Isle of Wight be forgotten, for in the rock pools, at Shanklin especially, the most magnificent form of *Padina pavonia* may be found growing during the summer months in the utmost profusion.

In conclusion, I beg leave to say to those of my readers who, in the pursuit of algological knowledge, may chance to find themselves in an unexpected difficulty, it will give me pleasure to afford them information and any assistance in my power.

Templestowe, Torquay.

SKETCHES IN THE WEST OF IRELAND.

By G. H. Kinahan.

The Neighbourhood of Gort.

GORT is situated on a plateau of limestone, bounded ou the west by the hills of Burren, and on the east by the mountain group called Slieve-Aughta, the latter being composed of Cambro-silurian rocks, capped in places by the lower carboniferous conglomerate, grits, and sandstones (commonly called old red sandstone), forming table-topped hills; moreover, the latter rocks and their accompanying shales are banked against their flanks. The Cambro-silurian black shales at Belvoir are remarkably rich in well-preserved graptolites.

The limestoue plain may be noted on account of its system of subterranean rivers. A large infall of water flows from Slieve-Aughta into loughs Cooter and Coole, and the connection between the latter and Galway Bay—a distance of five miles—to the nearest point at Kinvarra, is underground; while over a large portion of the plain it is impossible to say whether the drainage is south-westward through the river Furgus to the Shannon, or north-westward to Galway Bay.

The Lough Cooter catchment basin includes a considerable portion of Slieve-Aughta, while from the south end of the lake flows the Beagh river, having an overground course for about two miles, when the stream disappears into the limestone rock under a boulder-clay-drift cliff about 70 feet high, the place locally being called "The Caldron." From here the river course can be traced for nearly a mile by breaks in the roof of the subterranean passages, forming marked precipitous hollows, or cavities, known as the "Devil's Punch-bowl," the "Blackweir," the "Ladle," and the "Churn," to "Pollduagh," a cave out of which the water rushes to daylight.

From Pollduagh northward for about three miles there is an open river to the ruins of Kiltartan Castle, where it again takes the ground; however, farther west, in Coole demesne, it appears for a short distance, and eventually flows into Coole Lough, having first mingled its waters with those of another subterranean river that receives the drainage of the northern portion of Slieve-Aughta. From Coole Lough the waters flow underground to Caherglassaun lake, and from thence to the sea at Kinvarra, a large stream appearing through the joints of the limestone in the vicinity of Dungorey Castle.

Where the Beagh river takes the ground at "The Caldron" it is yearly cutting into a high bank of boulder-clay-drift that contains blocks and fragments of sandstone and limestone, all of which disappear. The latter may dissolve in the water and thereby be carried off in solution, as the chert which they contain forms an angular gravel in the bed of the stream; but the sandstone blocks could not be similarly disposed of. Some of the latter, undoubtedly, are ground up; for, when the stream is in flood, and the waters, hurrying underground, form a rushing gurgling whirlpool, the blocks can be heard rolling about and grinding against one another. This, however, can scarcely account for the disappearance of all, as hundreds of them come down each winter; yet when the water is low during the summer months, only a few of them are to be seen; therefore it only remains for them to be carried underground. This, when the stream is seen in its summer aspect, would appear impossible, as the water flows on to a filter of blocks and gravel; but when the floods arise, these gradually get into motion, until at last all are being whirled round and round, while some possibly find their way into the vent and are carried away in the stream. In favour of this theory it may be pointed out that blocks of sandstone are found in the bed of the subterranean stream at Pollduagh.

The exit of the river in the vicinity of Kiltartan Castle is remarkable. It is evident that at former periods the water flowed at two higher levels, but in each case, as the subterranean passage increased, they fell into disuse. The highest level is now quite abandoned by this river, and a small stream flowing southward into the river occupies it, while the middle level is still used, but only in high floods. If there is an over-supply of water, too much for the lower embouchure, the water rises to the second level, along which it flows to a cavity in the roof of the under-passage, where it finds an exit, and rushes down, forming a whirlpool; thereby proving that the internal capacity of the passage is greater than its entrance.

In the country about Gort, as also in many other limestone tracts in Ireland, at the ingress or egress of the subterranean rivers, sheets of water may form, that are locally called "Turloughs;" or a turlough may exist in a hollow under which there is a subterranean stream, the latter bursting up and overflowing during freshets, forming a sheet of water. Many of the small lakes hereabouts have no surface-outlets, and although they do not become dry in summer, yet are a variety of *turlough*, a good example being the small lake called Lough Kiulea, about six miles west of Lough Rea. The water in this lake in dry weather lies at the bottom of a deep cup-shaped hollow at least thirty feet lower than the adjacent road, while in floods the surface of the lake reaches or even overflows on to the road; but, on account of the steepness of the sides of the hollow, the difference between the area of the water in flood and drought is small.

A remarkable turlough is formed during floods in connection with Coole Lough. During the dry weather the drainage from all sides flows into the lough; but if a flood arises, the subterranean vents are insufficient to carry off the waters; consequently they rise, fill the lough, and overflow to the south, forming an extensive turlough in the hollow adjoining the Newcastle Racecourse. The extent and sudden rise of the floods may be judged from the following:—On the 12th October, 1852, a cricket-match was played on the racecourse of Newcastle, and in the adjacent streams there was scarcely any water; but in the succeeding week there was rain, and on the 21st of the month the whole of it was covered, in places being over twenty feet deep. The area under water, including the flooded land about Coole Lough, was at least 500 acres. It should, however, be mentioned that this October was the wettest of the seventeen years preceding, the rainfall being 7·61 inches, while the average was 4·03 inches, the other wet years being 1846, 1851, and 1853, whose figures respectively were 6·85, 5·35, and 5·72 inches by the Rev. C. Mayne's rain-gauge at Killaloe; the rainfall of October, 1862, being nearly twice the average of the preceding seventeen years.

Some of the low-situated lakes and turloughs are affected by the rise and fall of the tide, the rising of the tide damming up the subterranean egress of the fresh water, causing the latter to rise in the lakes or turloughs. In some of these during floods the rise and fall, from the extent of the water being only a few inches, is nearly imperceptible; but when the lakes are low the rise and fall is as apparent as that of the tides in Galway Bay. This phenomenon can be well observed in the "Sluggaghs" in the vicinity of the mine on the west of Caherglassaun Lough, and at Hawkhill Lough, between three and four miles west of Gort.

There are various ruins in the vicinity of Gort, that would more or less interest the archæologist; but special attention must be directed to the old castle a mile S.W. of Lough Cooter, the walls of which were painted in fresco, some of which still remain. The flora also is interesting; as, however, nearly all the rare plants are found in the Burren, one description hereafter will do for all.

TEMPORARY APPEARANCES AND DISAPPEARANCES OF PLANTS.

HAVING read with much interest the paper by Mr. Edwin Lees in the April number of SCIENCE-GOSSIP, "On changes in the localities of some of our rarer plants," I am induced to offer a few notes on some instances of the temporary disappearance of species which I have noticed in this neighbourhood, with the flora of which I have been acquainted for more than a dozen years.

Erodium moschatum used to grow on an old wall within one hundred yards of where I am now writing: it was observed there by my father nearly thirty years ago. This is the only place in which I have ever found it, and I have observed it there now and then for many years; but some seasons I have failed to find it after a careful search. In 1868 the wall was pulled down, but the Cranesbill was very plentiful around its site, and, the soil being rich, attained an immense size. The next two summers it grew scarcer, and this year I can find no trace of it.

In 1862 a heap of sand was thrown up out of a quarry in Beckington, which in the summer was covered with a scarlet blaze of poppies; among them two or three plants of *P. Argemone*, a species which I had never seen in the neighbourhood before, and did not see again, although I looked for it in the same place nearly every year, until 1868, when I found it there again, and I have found it in each succeeding year.

The only station for *Atropa Belladonna* near here is Farleigh, Hungerford, where a single plant grew among the ruins of an old castle for many years; but the station being unfortunately too well known to collectors, it grew smaller year by year, until in 1869, finding none left, I feared that it was lost. In 1870, however, I noticed one or two young plants on a bank some little distance off, which are now growing nicely, and will, I hope, establish the species firmly, if not pursued by collectors with too sedulous attention.

When a boy, I remember being shown by my father in a field near Beckington, a plant of *Lathyrus Aphaca;* but this singular vetch I never saw again until the year 1869, at least fifteen years afterwards, when I found several plants of it growing in a hedge that I am in the habit of passing several times a week. I refrained from gathering many specimens of it, thinking that I would let it remain and seed; but next time I passed I was mortified to find it all gone—some one having cut the grass on the bank to give to his horse. In 1870 I did not see any; but last year it was growing there again.

I never saw *Campanula hybrida* nearer here than the Wiltshire chalk downs, except in the year 1869, when a wheat-field a mile off was quite full of it—probably introduced with seed corn.

Many liliaceous and orchideous plants bloom very seldom; consequently, if one of them grow sparingly at a station, it may be missed for several years, the root-leaves escaping notice, and yet reappear. I have noticed this with *Gagea lutea*, *Fritillaria Meleagris*, *Cephalanthera grandiflora*, *Epipactis latifolia*, and others; and hence I have not quite abandoned all hope of meeting with *Ophrys muscifera* and *Tulipa sylvestris*, each of which my father has once found.

I have noticed that root parasites, such as *Lathræa squamaria*, *Monotropa Hypopitys*, and *Neottia Nidus-avis* are very uncertain in their appearance; one may find them in this place one year, and then lose sight of them for several years, till one finds them again in a different place.

Biennials also, as *Verbascum Lychnites* and *Blattaria*, I have failed to find sometimes in familiar localities, owing to there being no flowering plants that year, the plants of the last year but one not having been allowed to remain to seed.

One sentence of Mr. Lees's I do not understand. He says, "It is important to know whether a rare plant has increased or diminished, as in the former case its claims to be considered truly indigenous are better founded." I should have thought that the reverse was the case. The gradual extinction of many of our rare British plants, as *Peucedanum officinale*, *Senecio paludosus*, *Sonchus palustris*, *Menziesia cærulea*, and *Cypripedium Calceolus*, is not held to invalidate their claims to be considered natives, nor does the rapid spread of *Elodea canadensis*, *Veronica Buxbaumii*, &c., establish their titles to be indigenous.

H. FRANKLIN PARSONS, M.D.

Beckington, Somerset.

"THE little birds have neither storehouse nor barn, yet He feedeth them; and not one of them falleth to the ground without His permission."—"*Beautiful Birds in Far-off Lands.*"

ON THE COLOURS OF LEPIDOPTERA.

BUTTERFLIES, birds, and flowers are the poetry of nature. What would the world be without their bright colours, sweet songs, and fragrant odours? Every one with an eye for beauty is charmed with the hues of the Lepidoptera. It is a common error with the non-entomological to suppose that bright colours are confined solely to the Papilionidæ. I have often enjoyed, when showing my collection and have brought out the drawer containing the Enchelidæ and Chelonidæ, to hear the exclamation of surprise, "Those moths, I thought they were butterflies, they are so pretty!"

Of the effect of heat in intensifying colour, the Cleopatra of Madeira, compared with our own *G. Rhamni*, affords a striking example, the orange spots in the latter being suffused over a great portion of the wings of the former. In early spring, when the sun has but little power, the first butterflies we meet with are those with little or no colour; namely, the Whites. As the season advances the tints become brighter, and whites with orange-tipped wings (Cardamines) appear; but it is in summer and autumn, when the sun is in his might, that the choicest and loveliest specimens of our Lepidoptera are found. Then it is we look for Iris, in his robe of purple; Atalanta, in her vivid scarlet, approaching nearest to the glories of the tropics; Io, of softer, but not less exquisite beauty; Edusa, the Blues, the Golden Skippers, and Argynnidi. Beautiful though the Papilionidæ of this country may be, however, they are far excelled by exotic insects. Here is a wealth of colour in which the eye can revel with delight. Many possess a metallic lustre of which we have but one example—the Coppers; others, when in certain lights, or held in certain positions, change their colours very remarkably, no doubt owing to scales of different shades being placed transversely, like the threads in shot silks.

It is somewhat curious that blue, though of such frequent occurrence in buttterflies, is entirely absent in the Heterocera; the band on the hind wings of *C. Fraxini*—in reality a French grey—being the closest approximation; while the crimson prevailing so much among moths is wanting in butterflies. Again, it is noticeable that the bright colours of moths—and many of them are not surpassed by butterflies, witness the Tigers, Cinnabar, and Catocalidæ,—are confined to the hind wings, the upper being of sober hues, or at least only streaked and flecked with the bright tints of the lower. When settled, the hind wings of moths are always hidden from view. May not this be taken as another instance of the wisdom and care of the great Creator for the meanest and feeblest of his creatures? It is indubitably a means of protection, by which, being rendered less conspicuous objects, they are enabled to elude the vigilance of many a hungry bird.

JOSEPH ANDERSON, JUN.

COLLECTION CATALOGUES.

MR. F. T. MOTT, in SCIENCE-GOSSIP for May, asks for information as to the best means to form a catalogue of a collection of 2,000 objects in such a manner that additions may be constantly made to it without leading to confusion. I have adopted a plan of my own, which I have found very useful, especially for indexing, and which I think may also answer Mr. Mott's purpose. I will give an example how I proceed, when wishing to form an index or other alphabetical list. While on the subject, let me say that in my opinion the neglect of a good index often deteriorates much the usefulness of a great many most valuable works, and I sometimes, for my own use, form an index to a book if I am likely to have to refer to it often, whilst reading it.

Taking a sheet of ordinary ruled foolscap, at right angles to the existing lines I rule others, and on these the various entries are written. Close to the edge of what would ordinarily be the front of the paper, between the first twenty-six lines I set down the letters of the alphabet, and then the sheet is ready for use. Suppose, for example, it is the page of SCIENCE-GOSSIP on which Mr. Mott's query occurs that I wish to index. I begin by writing under the letter S—Starling, The, 118; next under C, Catalogues, Collection, 118; next under G, Gas-light, Does G-L kill plants? 118, and so on. Thus several entries can be placed on each line, and there is only one page in use instead of, at least, twenty-six as is ordinarily the case. Although very easy to employ, the plan is difficult to explain. Perhaps it would be possible to set up an example in type.

*	*	*	*	*	*	*	*	*
A	B	C	D	E	F	G	H	I
		Cata	logue	s, Col	lecti	on, 1	18	
Ario	n ate	r 117	Elm,	Para	site	of, 10	8	
Arb	utus,	Berr	ies of	113	Eagl	e, Go	lden,	115
		Cuc	koo,	The,	105			

* Ordinary lines. † Extra lines.

If I wished to form an *exact* catalogue, for constant reference, of so many as 2,000 or 3,000 objects, I should then take a page for each letter, the leaves being fastened together at one end. Although by this means twenty-six pages would be employed instead of one, yet the subdivisions would be so much smaller than by the usual method that the extra labour would be fully compensated for. Thus the heading for the first page would be aa, ab, ac, ad, &c., and for the second ba, bb, bc, bd, &c. Notwithstanding some columns, such as bb, would, most probably, not contain a single entry, yet I should retain them, for the eye soon becomes accustomed to the position of the column for each letter, and knows at a glance the spot where the entry should be made.

If you think this plan will help Mr. Mott and others, I hope you will find room for it; if not, please consign it to the waste-paper basket.

ALEX. E. MURRAY.

CARBONIFEROUS FISH.

At the base of the coal-measures there occurs in Yorkshire a bed of coal which is different from any of those above it. This bed—the Halifax bed—is covered by a "roof" unlike that of any other coal-bed above the mountain limestone, and consisting of nodular concretions called "baum-pots," which contain not only the remains of plants and fresh-water shells, but also of fish and marine shells. The floor or sill of the coal of this series, instead of being, as in the other series, a peculiar fine clay, full of stigmaria, consists of *ganister* or *galliard*, a hard siliceous sandstone full of the roots of plants. The presence of this stone consequently furnishes an exact indication of the position occupied in the coal-measures of that stratum in which it is found.

In the "baum-pots" before mentioned I discovered last July, when staying in the neighbourhood of Leeds, several remains of fish, both scales and teeth, belonging to Agassiz's two great orders of fish, the *Ganoids* and *Placoids*.

The ganoid fish have been thus named by him on account of their being covered by enamel so hard that, if struck with steel, they will emit sparks like flint; thus differing from the fish belonging to other orders. Another peculiarity attaching to them is this,—the union of reptilian with fish-like characters, they being able to move the head upon the neck independently of the body, and the connection of the vertebræ by ball-and-socket joint, instead of by inverted cone, as in the ordinary fishes.

The representatives of this order of fishes are the *Lepidosteous*, or bony pike, and the *Amia* of North America, the *Polypterus* of the Nile and rivers of Senegal, and the *Ceratodus* of Australia. As all these genera inhabit fresh water, analogy points to the conclusion that their carboniferous ancestors lived in the same element.

No doubt many of those who have found the teeth and scales of extinct ganoids have been puzzled by not finding their entire skeletons. This is owing to these fish not having possessed entire bony skeletons: consequently, the cartilaginous portions of the fish have perished, whilst the teeth and scales have been preserved. In *Megalichthys*, however, Professor Huxley has discovered a ring or hoop of bone in its vertebra, whilst the rest of its skeleton consisted of cartilage.

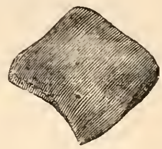

Fig. 110. Ganoid Scale of *Megalichthys*.

Of the scales of these fish examples are given That of *Megalichthys Hibberti* (fig. 110) is of a smooth rhomboidal form, with minute punctures that are connected with one another by means of canals.

The other scale, that of *Acrolepis* (figs. 111 and 112), is similar to the foregoing in shape, but differs from it in having its surface marked by deep channels. The former genus is found only in the carboniferous system, whilst the latter is found both in the carboniferous limestone of Derbyshire, the millstone grit and coal-measures of Yorkshire and in the Permian of Durham.

Figs. 111 and 112. Scales of *Acrolepis*.

The other great order of fishes, the *Placoids*, represented in our time by the Sharks, Dogfish, and Rays, have been so named by Professor Agassiz because they have their skins covered irregularly with plates of enamel, often of considerable dimensions, but sometimes reduced to mere points, like the shagreen on the skin of the Shark or the prickly tubercles of the Ray. The fishes of this order had cartilaginous skeletons, which were soon destroyed after they had perished.

The teeth of these fish are of *two* kinds,—either sharp and pointed, or massive palatal teeth, fitted for grinding. Of both these we have living examples; those of the Shark being representative of the former, and those of the Cestracion, the Port Jackson shark, of the latter.

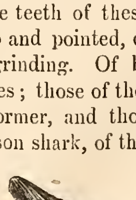

Fig. 113. Tooth of *Cladodus*.

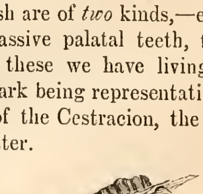

Fig. 114. Tooth of *Orodus*

Of the former we have an example in the tooth of *Cladodus* (fig. 113): this is a sharp conical tooth covered with shallow striations; whilst of the latter the teeth of *Orodus* (fig. 114) and *Psammodus* are instances. The former presents a serrated edge, whilst the latter is perfectly smooth.

Such are the characters of some of the fishes which formerly roamed in the carboniferous seas. Though but little is at present known of them, that little is sufficient to fill us with admiration of the wisdom and power of Him who has created all things.

REV. W. H. PAINTER.

HOW TO CUT VEGETABLE SECTIONS.

By WALTER WHITE.

"WE want pretty and interesting objects." This is the cry, which waxes louder in proportion as our ranks are augmented by the enlistment of fresh recruits. Let me commend to their notice sections of stems, leaves, seeds, and other portions of plants. They are pretty, as well as interesting; easy to mount, and moreover, when well mounted, very permanent. How to cut them is the rub. This seems to be a great stumbling-block; consequently we find very few amateurs' cabinets containing a really good selection of vegetable sections. One will tell you he hasn't time to cut them; another, that he has tried and failed; while a third has heard so much of the difficulty of section-cutting from those who have attempted it, that he thought it useless to go to the expense of a machine. Now, I hold that everybody who takes up the study of Microscopy ought early to learn how to make a good microscopic section. In Histology this acquisition is indispensable. As a means of mastering the art, nothing can be better practice than operating on the subjects before-mentioned. There is no royal road to section-cutting, any more than there is to other branches of Microscopy; yet a few practical hints may smooth the path a little, and tempt a few to turn some of their leisure moments in that direction.

The first thing necessary is a section-machine; the second, a sharp-cutting instrument. Besides these, two other things are also needed—those two proverbial conquerors of all difficulties,—namely, patience and perseverance. Assuming the reader to possess the two latter, I will proceed to put him in the way to possess the former.

I first began to think of cutting sections on September 1st, 1866, from seeing on that day, in SCIENCE-GOSSIP, a description of an instrument which I, in my innocence, then thought would answer that purpose. How anxiously I tried shop after shop before I could find the one where I could invest my penny in a music-binder! I need scarcely say the affair was a failure. Some time afterwards I got a watchmaker to cut me a screw, with which, a fishing-rod ferule, and a bit of brass plate, I knocked up an uncouth-looking piece of apparatus, which served my purpose pretty well for a long time. Yet, as the screw was not so fine or so well fitted as I could have liked, I cast about for a friend to cut and fit me a better. After many inquiries, I came into contact with a gentleman who very kindly recommended me to try wedges instead of the long-sought micrometer-screw. I took my nondescript to pieces, and in a very short time converted it into a machine, which, for truthfulness, simplicity of manners, and withal lightness of figure (in the cost thereof), leaves little or nothing to be desired. Here is an outline sketch of the apparatus, fig. 115; here also is the receipt for making it. Take a brass tube (fishing-rod ferule), T, about $\frac{6}{10}$ of an inch diam., and $1\frac{1}{2}$ in. long; inside of this tube fit a brass plug (P) of the same length. When smeared with tallow, this should fit the tube with a water-tight joint. Solder one end of the tube (T) into a hole that will just receive it, in the centre of a brass plate (X) 3 in. × $1\frac{1}{2}$ in., and about $\frac{1}{8}$-in. in thickness, having a hole at each corner to pin or screw it down to the block (B). This is the metallic portion, which any country tinker can easily make. The wooden portion can just as easily be made by any country carpenter — W, W, two wedges, each 15 in. long, $\frac{1}{2}$ in. thick, and 1 in. deep at the base of angle. They should be worked up true out of a thoroughly sound piece of beech or

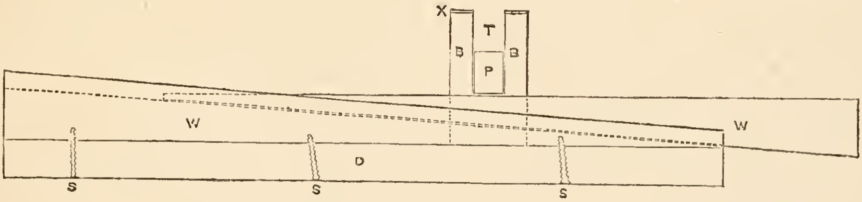

Fig. 115. Diagram of Section-cutting Machine. Scale $\frac{1}{4}$.

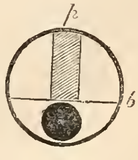

Fig. 116. Section of ditto.

mahogany. Cut two other wedges of the same angle, but rather longer, ¼ in. thick, and attach one to each side of the wedge, which is to be stationary, so as to form a groove to steady the loose wedge. This grooved wedge fix to a deal board (D), 15 × 3½ by screws (S). Now comes the block (B) of beech or mahogany, 2¾ × 3 × 1½. Through the centre of its longest axis drill a hole to receive the tube (T). Below the tube, and through its shortest axis, sufficient of the block is to be cut away as will span the fixed wedge. The block is firmly fixed by long and stout screws to the board D, in the position shown in the figure. The tube T is now inserted in the hole, and the brass plate (which I omitted to say should be perfectly flat and smooth) is screwed or pinned down to the block. On the face of the lower wedge gum a piece of paper, with lines ruled on it about $\frac{1}{30}$ of an inch apart, and the machine is complete.

The best cutting instrument, in my humble opinion, is a razor. A small one, made of "good stuff," should be selected. If the blade is fixed in a small bradawl handle, it will be more convenient to use. As it is perfectly useless attempting to excel in section-cutting with a tool that will not stand the usual test of cutting a hair, the reader, if he be not endowed with the accomplishment of razor-sharpening, had better make friends with some one who really is, and take a practical lesson or two.

Supposing the reader wish to try his 'prentice hand upon a wood stem (transversely), this is the way to proceed:—Get a cork and trim up so as to fit the tube rather tightly; with a cork-cutter make a hole through it in the position shown at *a*, in fig. 116, which should be the least trifle less in diameter than that of the stem. Next divide the cork lengthwise at *b*, taking care to escape the hole. Cut out the shaded portion (C), which is to be replaced by an exact counterpart of deal. Cut off an inch of the stem and place in the hole (*a*); put the pieces of cork and deal in their places, and push all gradually down the tube, with C towards the operator, the plug (*p*) resting on the thin end of the loose wedge. Have at hand a glass vessel of methylated spirit, and all is ready for work. Tap the wedge with the back of the razor till the stem just appears above the plate; then dip the razor in the spirit and take off a slice, cutting no further into the deal than is necessary. Cut off a few more slices, till you begin to feel used to it; then strop the razor afresh and see how thin and perfect a section is to be obtained, making use of the ruled lines as a guide for the distance the wedge has to be forced. An herbaceous stem will not require the cork and deal packing. Strips of the same stem will answer better, care being taken to pack firmly without crushing. Leaves will generally be placed between the two halves of a cork cut lengthwise; while seeds and other small things, such as unripe moss capsules, are best held in a mixture of wax and spermaceti. This is the *modus operandi:* Pour into the tube, in a molten state, a mixture of about equal parts bees-wax and spermaceti, and just before it solidifies place the seed in the mixture, in the desired position. When quite cold, the wax will fit the tube loosely: a thin splinter of deal forced down the tube will make it firm. This is also one of the best plans for vertical sections of stems.

Some recommend cutting towards, and others away from, the operator. I prefer the former method. Keep the razor well wetted; hold it firm and cut steadily, using plenty of the edge. The sections will generally stick to the razor, and can be shaken off into the spirit as fast as they are cut, thus keeping the razor constantly wet with the least amount of trouble. No rule can be given as to the thickness the sections ought to be cut; it depends upon the size of the cells to be brought into view. The smaller the cells the thinner the section, and *vice versâ*. A good transverse section should show the pith, wood, and bark all the way through, without a flaw. Wood stems should be gathered in the autumn, and placed immediately into spirit. They are never scarcely so good if allowed to dry. A good plan for identifying the stems after they have been soaked, is to cut on one end a Roman numeral, against which in a book the name is placed. Without some precaution of the sort, it may be rather embarrassing to a beginner to know which is which, out of a bottleful of stems that have lain by for some time.

Herbaceous stems should be cut as fresh as possible, and the sections allowed to remain in spirit a day or two, to empty the cells of chlorophyl, after which they should be well washed in clean water. Seeds are in the best condition for cutting just as they are ripening.

I have but little to say about the mounting. For transparent slides, perhaps there is no better plan of mounting the wood and seed sections than in balsam or damar. Some of the transverse wood sections,—for example, Clematis and young stem of Dog-rose, when mounted dry and revived by reflected light, are exceedingly beautiful, especially if a bright blue ground be used. Sections of herbaceous stems and the softer tissues of vegetables show best in fluid. To some of the thousands of ardent lovers of Nature, subscribers to SCIENCE-GOSSIP, I would fain believe my simple section-machine will be welcome. Every botanist now has a microscope; yet how few, amongst their collection of slides, can show a dozen good sections of their own preparing, illustrative of the physiology of the plants they take such pains to collect, dry, and classify. In their case, a little practice at section-cutting would throw open new sources of pleasure, increasing the interest already attached to the beautiful study of botany, and adding yet deeper feelings of reverence towards the great Creator.

THE CRAB A GEOLOGIST.

THE following notice of a natural phenomenon which I witnessed may be of interest to readers of SCIENCE-GOSSIP:—

As I was walking with a friend, some ten years ago, along the sandy shore of the Tenasserim coast, I was surprised to see in one place a large number of apparently rolled pebbles or stones extending along the beach for some distance, just above high-water mark. The reason for my surprise was that such a thing as a pebbly beach is nowhere met with (at far as my experience goes) on this coast. The entire coast-line of Tenasserim, from Amherst on the north to the Packchan river on the south, consists of alternating bold granite bluffs, which jut out into the sea, and semicircular sandy bays, with here and there an extensive mud-flat and mangrove swamp at the mouths of creeks and rivers. It is very hard to find a stone anywhere on any of the sandy beaches. Granite boulders of various sizes are frequently met with on the sand, but that is all. The very unusual appearance, therefore, of a number of stones, resembling shingle, collected together in one place, surprised me.

After my companion and I had amused ourselves with throwing about some of these stones, which were so hard as to have required a hammer to break them, we found that others (those nearest to the sea) were soft—of a firm cheesy consistency—so that the end of a walking-stick could be forced into or through them. This naturally increased our surprise; we therefore set ourselves to discover, if possible, the cause of this strange phenomenon. We were not long in doing this. The actual process of manufacture was witnessed. It may be stated here that the part of the coast spoken of is not far from the mouth of the Tavoy river, which expands into a broad estuary several miles across. This river carries down towards the sea a vast quantity of mud, the greater part of which is distributed along the coast-bottom to the south, owing to the direction of the river, which flows from north to south, the run of the coast-line being the same. At Mergui, also, only sixty miles to the south, another arge river, the Tenasserim, pours down its quota of mud, and this also is confined near the coast by the islands of the Mergui Archipelago, which stretch from near the mouth of the Tavoy river on the north, to near Junk-Selung on the south. I have dredged the bottom at intervals between Tavoy and Mergui, and found it to be mud the whole way inside the islands.

The consequence of this is, that although some of the reaches of sand on this part of the coast are very fine, the sand is, nevertheless, comparatively shallow, and it fines off rapidly to seaward, until, a little way out, pure mud is reached. In some parts, at low water, a very thin layer of sand covers the mud below. This mud is exceedingly stiff, and of the colour of the well-known blue lias. To come now to the manufacture of these stones. The crabs, which abound on tropical seashores, were here, although too small to be worth catching for the pot, considerably larger than I had seen in similar situations elsewhere; and, as the tide was low, we saw numbers of them running about the wet sands, and, as we approached them, they would dive rapidly down into the small round holes which it is their habit to burrow for themselves. In making these holes the crabs (as is, no doubt, known to many) throw out the soil in small round pellets or balls. I had frequently noticed at Amherst the tiny round balls of sand strewed about the holes which the smaller crabs there make. When the ejected material is sand, these balls are, of course, at once dissolved at return of each tide. But here, as the sand was only in a superficial layer, and the crabs were larger, in making their holes they penetrated through the sand and reached the mud; consequently the material thrown up was stiff clay, and the balls were larger in proportion to the size of the workers. Looking at these balls of clay as the tide was turning to flood, we soon perceived how our stones were made. The ripple of an advancing wave would first roll two of the smaller balls into one, then another wave would do the same with two larger ones, until, by a repetition of this very simple process, rounded balls of various sizes were formed, and ultimately, as the tide advanced, flung up high and dry upon the sand, out of the farther reach of the waves. Here they lay and hardened, until, in form, in weight, and in general appearance, they resembled *bonâ-fide* water-worn fragments of blue lias. There was a long line of these stones on the sand just above high-water mark, and they must have been numbered by thousands.

And, now, to offer a remark or two on this subject. It is easy to imagine that these stones, so strangely originated, may, at some distant day, be imbedded in a stratum of sandstone, and may, peradventure, form the subject of investigation by some future geologist (supposing, that is, the race o geologists to be as enduring as the strata which they make their study), and if so, they would probably be pronounced to be genuine waterworn fragments of rock older than the sandstone in which they were found imbedded. In this instance, our imaginary geologist will have been mistaken; for though indeed formed partly by the action of water on a seashore, they were so formed by a constructive, and not a destructive, proeess; and, moreover, they would be of exactly the same age as the sandstone.

But, if stones are being occasionally formed now by the singular method above described, why may they not have also sometimes been formed in a similar manner in the remote ages of the Past? If crabs, as is likely, inhabited primeval seashores and disported themselves upon them as they do now (I am, unfortunately, not geologist enough to know if there be any evidence to this point), then the same agency may have been at work in the formation of similar stones now found imbedded in existing strata, and pronounced to be waterworn pebbles of an older rock; and then also, *some* stones, so pronounced upon, may *possibly* have had a different origin from that which has been assigned to them. In ninety-nine cases out of a hundred probably, the commonly assigned cause would be the true one; but the little fact which I have related points to the possibility of rounded stones imbedded in ancient strata having sometimes had a different origin. I think it is also possible to conceive an instance in which the position of such stones relatively to contiguous beds, not easily explained on the usual supposition of their being waterworn fragments, might be accounted for by assigning to them an origin similar to that of the stones which I saw in the course of formation on the coast of Tenasserim.

Possibly, however, I have only been describing what has frequently been noticed before; though, if not—if what I have related should chance to be new—this trifling record may prove of interest, as indicating a plan of operation in Nature's great and multifarious workshop, which, I venture to think, would hardly be guessed at even by the most ingenious theorist. C. S. P. Parish.

THE EUPLECTELLA.

YOUR article on the Glass-rope Sponge (*Hyalonema mirabilis* of Gray), and the figure on p. 36, in the February number for 1872, called to my remembrance the account given me many years since by Mr. John Reeves, of Clapham, of the specimen of Glass-rope then in the East-India Company's museum. He stated that the specimen was the remnant of a stem of a Gorgonia, after maceration in acid by the natives of some island or coast in the Indian Ocean. When I first saw *Euplectella speciosa*, and observed the *beard* at its base, I was led to the conclusion that this was also a preparation from a spongoid animal, bleached probably by immersion in water, during which process the ova of crabs had passed through the meshes, and became slowly the mature animals that one sees inside Euplectella. Lately, in looking through Esper's work on corals, to find a figure of that coral-like Gorgonia of which Mr. Reeves had spoken, I was arrested by the plate in vol. iv., No. XVI., of which I enclose a copy. There I found a Euplectella attached to a shell, and having its spongy coat on; while below was an enlarged figure of the natural appearance of the coat. Being in London lately, I visited the British Museum for the purpose of examining the specimen from Mr. Broderip's collection, which has the gelatinous coat

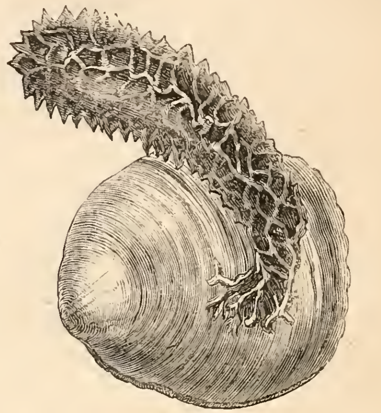

Fig. 117. *Tubularia clathrata.*

still adhering to its cap; but the Museum was shut, the day being a holiday, and I failed in obtaining a private view, as in good old times it was the custom to allow. The figure given by Esper, however, is sufficiently marked to prove the original state of Euplectella; and his description, which I will quote, proves that his figure is no exaggeration. The translation from the German is as correct as I can make it.

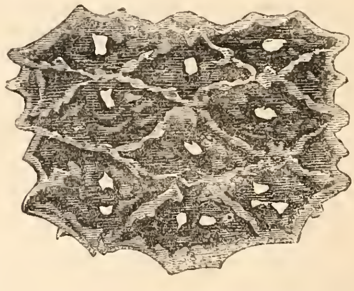

Fig. 118. Portion of ditto, magnified.

"Net-shaped Tubularia.—In this sea-product, the organic construction of the animal is not sufficient to decide the way of growth and vessels of nourishment. The net-formed cavities come nearer the sponges; but it has a shining substance, and softens in water, and the web of this is of quite different construction. It consists partly of strong threads, partly of leafy gills. It cannot be the dwelling of some foreign animal, for it is locked at the largest end.

"This product was found in the seas by Bengal, and was given to me, as a rarity, by the late Reverend Chemniter, who had it of Mr. Missionary John, of Tranquebar."

Esper gives, in Plate XIX. of the fourth volume of the same work, the figure of *a group* of another Tubularia, which he names *T. botryoides* ("grape-shaped Tubularia"), and states that in structure it is akin to *T. clathrata*. "The colour," he adds, "was at first yellow, but faded into light yellow, and, according to others, into white-grey."

He had received this also from Mr. Missionary John, of Tranquebar, as a very rare product from the coast of the Carnatic.

REV. GERARD SMITH.

THE WHITE WHELK.

(*Buccinum undatum.*)

THERE are few univalve shells better known than this. Our readers who have visited the East-end of London must have seen both the shells and their builders exposed for sale, the latter hanging out with a yellow-looking, leathery appearance, which does not tempt the palate of the novice. Our British liking for the Whelk is peculiar, and does not seem to be shared by any other nation. How far we are consumers of it is indicated by the evidence on the Whitstable Oyster-fishery Extension Bill in 1866, when it was stated that the whelk fishery on a sandy flat in that bay yielded twelve thousand sterling a year!

Fig. 119. *Buccinum undatum.*

The "White Whelk" is popularly distinguished from the "Red Whelk" (*Fusus antiquus*) by the colour of the latter, although science distinguishes them by more technical distinctions. No one can mistake its vertically furrowed and grooved exterior, its short canal, and, except when covered by its epidermis, its whitish appearance (fig. 119). It has a very respectable antiquity also, dating back from early Pliocene times. The physical disturbances it has survived have been numerous and extensive, but they have failed to render it extinct, probably owing to the ready manner with which it seems to adapt itself to varying conditions. It is a known zoological rule that a species numerous in individuals is generally also productive of varieties. Mr. Gwyn Jeffries enumerates *six* distinct varieties of the "White Whelk," besides others less so. That some of these varieties are permanent is evident from their having been also found in post-glacial deposits. Moreover, the Whelk inhabits all kinds of marine ground, from the shore to the greatest known depth. Much as it seems to dislike fresh water, it has nevertheless established itself along the mouths of rivers. All these conditions point to a great antiquity to allow the species to gain a footing and to assume distinct and permanent varietal characters. This we should have reasoned to, if the shells of the Whelk were not found in pre-glacial beds. The genus *Buccinum* has a still higher antiquity, dating back from the Lower Cretaceous epoch. Dr. Woodward enumerates about twenty recent typical species, which are chiefly to be found in northern and antarctic regions. This wide isolation of areas is significant. No one would contend for two generic creations to have occurred in seas so widely separated;—if not, then the *Buccinum* must have been driven away from the intervening regions; and such a process would take up all the time which has elapsed since the Cretaceous period. More than one hundred and thirty species are known in the fossil state.

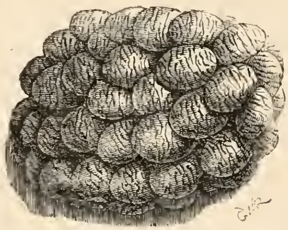

Fig. 120. Egg-cases of *Buccinum undatum.*

The "White Whelk" is greedily carnivorous, the decaying fish placed in lobster-pots, &c., being soon covered with them. On the other hand, however, it is itself a choice delicacy with the Cod, and thousands of whelks are caught for the purpose of exportation to the cod fisheries. The tongue of this mollusk has long been a favourite object with microscopists. It possesses no fewer than one hundred rows of teeth. One of the commonest of sea-shore objects is the nidamental capsule of the "White Whelk," looking for all the world like a large bunch of hops (fig. 120). In each of these capsules there are inclosed at least a score of young mollusks, with shells complete; so that they come into the world, Minerva-like, ready-armed. The spawning season is between October and May, the developement of the fry requiring about two months. J. E. Taylor.

THE GREEN FIELD-CRICKET.

(*Gryllus viridissimus.*)

SEEING a paper in a recent number of Science-Gossip (p. 59), on this interesting insect, has induced me to write a few lines upon the subject, which I trust may be interesting to the writer, "E. A. M."; and as she craves further information on the subject, I trust this will have the desired effect.

This beautiful, and by no means rare insect, is one of the largest of the "merry" tribe designated Crickets, and cannot fail to attract the attention of the most juvenile of entomologists. The males in the months of July and August enliven the summer evening rambles with their shrill music; the females are, however, much less noisy, only uttering a low call, whilst that of the males is a continuous song. I have more than once been deceived, whilst listening to the singing of this insect, with regard to the distance he is off, for there is a peculiarity in the sound, which leads one to judge that he is very near, yet you may go on for yards further ere you get to the spot where the *Gryllus* is going through his performance. Should you be fortunate enough to catch a sight of him and wish to make him yours, you must approach him with the utmost caution, for if he hears the least sound, he at once ceases his song, and deigns not to resume it until "silence reigns supreme." I have also observed that when one of these insects takes up his abode in a certain bush, he seldom wanders far away from his chosen haunt, but goes through his performance at sunset, evening after evening, in the selfsame spot. I have on several occasions, whilst out in search of Lepidoptera, taken three, and even four, of these insects in an evening, but I have never, except on one occasion, taken a female, which may be easily distinguished by its long ovipositor. My mode of capturing him has been to follow the sound, and to approach as cautiously as possible until the creature is discovered, which is not always an easy matter, on account of its near resemblance in colour to the herbage, and if possible to get behind him, and gently take him by the tip of the wings between the forefinger and thumb, which, however, requires no small amount of caution, for if he catches sight of his enemy, he gives one good spring and is quickly out of sight, and you may hear him a few minutes after singing away as merrily as if nothing had happened. On one occasion I was greeted with rather a sharpish bite for my trouble, for these little creatures are quite capable of giving you an unpleasant nip, if you do not display a little care in taking them, and I was not aware, before this, that they had a tendency that way. One thing must be avoided,—putting two into the same box together, for they are pugnacious little fellows, and will fight vigorously until one of them comes off short of some appendage; even that will not cause him to retire from the field.

If kept, these creatures will often become very tame and live for a long time in confinement, and will sing away as merrily as if in their native cornfields or hedgerows. As in the case of "E. A. M.," I have fed them with small flies, which they readily devour, and with evident gusto, and occasionally, by way of change a piece of apple, which they also relish; in fact, scarcely anything comes amiss to these voracious little creatures; and, alas! they will often prove cannibals, and devour one another. I have many a time been greatly amused in watching their actions, particularly that mentioned in Mr. Ulyett's paper as "cleaning its teeth," which seems an important process—whatever it may be—in the life of *Gryllus viridissimus.* You may often observe him gnawing away at a blade of grass in the same manner as a caterpillar, beginning at the top and working downwards. My first specimen I put into a cage with the sides of glass, and a black muslin top, but he amused himself by gnawing the muslin through, and soon effected an exit.

It would be interesting to know how the peculiar sound made by this creature is caused, for many and varied are the opinions of authors with regard to the origin of the sound. "In the male," says De Geer, "in that part of the right elytrum which is folded horizontally over the trunk, there is a round plate made of very fine transparent membrane, resembling a little mirror, or piece of talc, of the tension of a drum. This membrane is surrounded by a strong and prominent nervure, and is concealed beneath the fold of the left elytrum, which has also several prominent nervures, answering to the margin of the membrane. There is," he further remarks, "every reason to believe that the brisk movement with which the grasshopper rubs these nervures against each other produces a vibration in the membrane, augmenting the sound. The males in question sing continuously in the hedges and trees during the months of July and August, especially towards sunset and part of the night: when any one approaches, they immediately cease their song."

R. Laddiman.

THE WOOD SPIDER.

THE following is from the March number of the "Cape Monthly Magazine," published in Cape Town:—"While wandering over the wooded hills of the Kleinemond River, with my net and portfolio in search of specimens, &c., I came suddenly upon a small recess, or opening in the forest. It was clothed in long waving grass; through the adjacent lofty branches, a burst of sunshine had stolen in upon its centre, forming a glorious contrast to the surrounding shade.

"Two trees stood apart from the trees of the forest, near the centre of the grassy recess, and were conspicuous for the light colour of their stems, which was evidently produced by the presence of a minute species of moss or lichen, similar to that which whitens rocks in high localities or mountainous regions. Suspended between the stems of the trees, was the light transparent net of a wood spider. I could scarcely distinguish its slender meshes in the bright sunshine; the spider was upon it at the time, busy with some repairs, or probably its presence would not have been suspected. It was one of those peculiarly formed species, which invariably excite our wonder and surprise, having a long process or horn projecting from the centre of the body, which to a casual observer would have appeared an incumbrance of no ordinary magnitude. At my approach the little creature seemed somewhat startled, so off it trotted and seated itself upon its hiding-place, the bare stem of the tree, where I soon perceived that its resemblance to a spider or anything that had life was no longer evident; for as it sat motionless, with the long projection from the centre, and its legs carefully folded beneath its body, it was a fac-simile of the knots of wood or protuberances upon the bark of the trees which it inhabited,—the long horn resembling the remains of a former twig or branchlet which had died or fallen away, leaving only its footstalk to show where once it had been.

"The colouring and pattern upon the spider, in every particular, resembled that of the moss-clad stems of the trees; upon its legs when folded was a minute round patch of white, surrounded by brown, similar to the smaller patches of lichens which dotted the bark; in fact the imitation was perfect,—a small knot of wood with the remains of a broken twig upon it. For some time, I stood near, admiring the beauty and simplicity of the contrivance. At length, to try the spider's faith in its concealment, I waved my hand ominously near, almost brushing it from off the stem where it sat. The spider, however, strong in the belief of its security, was not the least alarmed, but remained immovable.

"After leaving the forest and its quiet occupants, the idea occurred to me that perhaps the lichens that in a great measure covered the stems of the trees grew also upon the back of the spider, as barnacles do upon the creatures of the sea. This, however, was mere conjecture, for although I believe it possible, I do not think it probable. The wonderful and varied forms of spiders adapting themselves to every condition of life even under the most adverse circumstances, is evident to all who have made nature their study. Obviously, the spider's form and colouring is a provision for the safety of a creature that has no wings to flee from its enemies, or other means of protecting itself; and it is one of the many of Nature's pretty little pieces of ingenuity, which will invariably strike a reflective mind, causing him to admire, wonder, and speculate at a beautiful contrivance for the safety of a spider, a thing, apparently of so little value. 'That ugly spider!' is the usual exclamation, an insect despised by nearly all, feared by many, and sought after by none. Nevertheless, who shall decide or condemn? Not we, who have made the study of God's works our pastime, for he 'who marks the sparrow's fall,' regards the spider likewise, and has set apart the work which is allotted to it; it has its 'mission;' for is not the spider one of those appointed to keep down the preponderance of insect life,—one of the protectors of our herbage-plants? Go into the forest and watch its oft-replenished net, and mark well the creatures that are snared therein, and learn a lesson that, without our friend the 'hideous spider,' there would be a missing link in Nature's endless chain."

M. E. Barber.

MICROSCOPY.

Cleaning Sand Foraminifera.—The following plan is given in Mr. Davie's work on "Preparing and Mounting":—"First, thoroughly dry the sand in which the objects are; then pour the mass into clean water, when the sand will sink to the bottom, and the Foraminifera, being filled with air, will float upon the surface of the water: they may then be skimmed off and dried. To clean the specimens place them in a vessel (I should think a small test-tube would answer the purpose very well), add a weak solution of potash, and boil for a short time; wash *well* in water, dry, and mount according to structure." I cannot vouch for the efficiency of this process, as I have never prepared any objects of this class myself.—*Wm. Sargant, jun.*

Collins's Light-corrector.—Mr. Collins has just devised an ingenious apparatus for this purpose, consisting of a brass stage-plate with a groove, in which rotates a diaphragm of four apertures, one of them being open, and the other containing blue glasses of special tint, and one with a finely-ground surface. These effectually correct the yellowness of all artificial illumination, making the light soft and agreeable to the eyesight, as well as improving the definition. It is, in fact, an improvement on Rainey's Light-modifier, so as to obtain more varied effects, and does not require any special fitting, as it can be used on any microscope.—*Popular Science Review.*

Diatomaceous Frustules. — Professor H. Smith states in the "Lens," that he believes all diatomaceous frustules to be "siliceous boxes," with either one portion (the cover) slipping over the other, as in *Pinnularia*, or with edges simply opposed, as in *Fragilaria*. If we take a frustule of *Melosira*, it may be compared to a pill-box, one portion slipping on to the other. The great majority of diatoms are thus constituted.

ZOOLOGY.

Birds' Geographical Range.—There are certain though somewhat indefinite limits to the range of birds; limits governed, however, by climate rather than by physical boundaries. Thus the Dusky Albatross (*Diomedea fuliginosa*) was observed by Captain Beechey to be numerous in the Atlantic, from the Rio de la Plata to the latitude of 51° south, when it suddenly disappeared; but after rounding Cape Horn, the species again occurred at the very same latitude of 51°, and continued numerous all up the coast of Chili. The Tropic Birds (Phaethon), in like manner, as their name imports, chiefly frequent the ocean within the tropics; and according to the statements of all voyagers, are very rarely seen beyond the parallel of 35°.—*Gosse, "The Ocean."*

A Curious Insect.—I had an opportunity of observing a curious insect which inhabits trees of the Fig family, upwards of twenty species of which are found here. Seven or eight of them cluster round a spot on one of the smaller branches, and there keep up a constant distillation of a clear fluid, which, dropping to the ground, forms a little puddle below. If a vessel is placed under them in the evening, it contains three or four pints of fluid in the morning. A similar but much smaller homopterous insect, of the family Cercopidæ, is known in England as the Froghopper (*Aphrophora spumaria*), when full grown and furnished with wings; but while still in the pupa state it is called Cuckoo-spit, from the mass of froth in which it envelops itself. The African species is five or six times the size of the English.—*Livingstone, "Missionary Travels."*

The British Association.—Great preparations are being made to render the British Association meeting at Brighton, on the 14th of August, a complete success. Philosophical naturalists will expect a treat in Dr. Carpenter's inaugural address.

Modern Subdivision in Science.—"That our ancestors did not subdivide as much as we do, was something of their luck, but no part of their merit. Simply as subdividers to the extent which now prevails, we are less superficial than any former age. But is it better to be a profound student or a comprehensive one? In some degree this must depend upon the direction of the studies, but, generally, I think, it is better for the interests of knowledge that the scholar should aim at profundity, and better for the interests of the individual that he should aim at comprehensiveness."—*Thomas De Quincey.*

Rearing Atropos (p. 20, Jan. No.).—This species is often troublesome to the breeder, and it is very mortifying, after having captured the noble larva, to have it die upon our hands in the pupa state. Naturally, the larvæ descend to some depth in the earth, and thus escape the effects of mud, moisture, or drought, heat or cold. The nearer we can bring their condition in winter to that which they would be in if at large, the greater are our chances of rearing; and if a larva has gone down for the winter in a flowerpot, or similar article, the exposure of this out of doors throughout the winter, in a place not too exposed, may be advantageous. The earth with which the larvæ are supplied should not be too fine, nor clayey. The difficulty is, how to adjust the moisture which seems necessary, so as to keep the pupa in health, without bringing on any decomposition. Dryness seems, in this instance, to be more prejudicial than damp: in many other species, we know that the pupæ will thrive if laid merely upon dry moss and kept moderately cool. Mr. H. N. Humphreys states that he managed thus:—"A large flower-pot being selected, I stopped up the hole with a cork, taking care to pass a quill, open at both ends, through the cork, to serve as an escape-pipe for superfluous wet, and yet not being large enough to allow of the escape of the caterpillar; then, having put in a layer of pieces of broken pots, to secure sufficient general drainage, the pot was nearly filled with light garden mould, a piece of strong canvass tied tightly over, and the pot plunged up to its rim in a sheltered part of the garden." It being an ascertained fact that of each annual brood of Atropos a certain part (nearly, if not all, barren females) emerge in the autumn, some entomologists have recommended the "forcing-out" of any captive pupæ. This has now and then succeeded; much more frequently, however, through lack of sufficient nicety in the administration of heat and moisture, the specimen is dried up.—*J. R. S. C.*

Extracting Poison from the Rattlesnake.—The process of extracting the poison from the rattlesnake (*Crotalus horridus*) for medicinal purposes whilst the reptiles were still living, has been succesfully accomplished by Mr. J. C. Thompson and Dr. Hayward, of Liverpool. The following was the *modus operandi*, if any of our readers care to do likewise:—The reptiles were in separate compartments of a large case, fitted with a double lid for extra security. A long staff, fitted with a thick india-rubber noose at the end, which could be loosened or tightened by the hand at pleasure, was inserted through the partially opened lid, and the opportunity quickly seized of slipping the loop over the snake's head, the loop being immediately drawn tight by means of the cord attached thereto. With a similar contrivance the tail was next fastened, and the snake, being thus securely held, was lifted out of the box on to the floor of the room. A pickle-bottle containing chloroform was then thrust over the snake's head, and carefully held in its place by keeping time to the animal's efforts to extricate itself. As the reptile became stupefied, the noose was gradually relaxed to enable the lungs to have full play, and when it appeared powerless, the snake was laid in a long narrow box made for the purpose, with an aperture at one end, out of which its head projected while the after-operation was performed. Its jaws were then opened and fixed, and the poison-glands were pressed with forceps, then with the gloved finger and thumb, while a small blown graduated phial was held to receive the drops as they slowly oozed out through the poison-fangs. Twenty drops were the average quantity yielded by each snake. The venom is of a straw-colour, thick and gummy in consistency, and decidedly acid in its reaction on litmus-paper. It is readily soluble in glycerine or water, but is precipitated by strong alcohol, the precipitate being re-dissolved, with the addition of a little water. Its toxicological properties were fully tried on a variety of animals. Half a drop produced death in a linnet within three minutes after being injected under the wing.

New Netted Glass-rope Sponge.—The British Museum has just received a very beautiful clavate netted sponge, discovered in the Philippines, which Dr. J. E. Grey has named *Meyerella claviformis*, after its discoverer, Dr. A. D. Meyer. The following is the description:—"Sponge simple, elongate, clavate, acute at the apex, at which are several tufts of short cylindrical fibres. The body of the sponge is elongate-fusiform, with longitudinal ridges irregularly disposed, often inosculating together, leaving various-shaped deep concavities on the surface. These ridges, and the very numerous irregular-shaped, often confluent elevations in the concavities between them, are furnished with various-shaped large oscules on the upper surface. The sides of the ridges and the tops of the prominences are all united by a very fine cobweb-like netted coat, formed of numerous fibres, and pierced with an immense number of very minute, exceedingly close perforations. The stem cylindrical, thick, ending in a thick cylindrical tuft of elongated glassy fibres, evidently anchoring the sponge in the sand. Numerous cylindrical bunches of fibre are to be seen through the substance of the sponge, extending throughout the greater part of the length of the stem."

New Species of Insects.—In the *Entomologist's Monthly Magazine* for July, Mr. C. G. Barrett describes a species of Tortrix from Great Britain, new to science, under the name of *Dicrorampha herbosana*. In the same number, Mr. E. C. Rye enumerates three species of British coleoptera new to our list.

Provincial Natural History Societies.—The Natural History Society of Bury, in Lancashire, although it has only been in existence since 1868, has already done good work. The report, from the time of founding to December of last year, has just been published. It includes a list of the plants, insects, birds, and animals of their district, all authenticated by members of the society. This is an example that might be followed by other societies with great benefit to natural science. We notice, also, an interesting excursion made by the Caldervale Naturalists in June, for botanical and geological purposes. The Report of the Winchester Scientific and Literary Society for 1870-71 contains an abstract of all the papers and lectures read or delivered before the Society; but the most noticeable feature is a list of the flowering plants, ferns, &c., found within seven miles from Winchester. The majority of these have been collected by members of the Botanical Section during the last two years, and the list is very full and complete.

BOTANY.

Preserving Fungi.—Mr. S. Hibberd, in his work on "Field Flowers," says: "Fungi may be dried by the simple process of bedding them in silver sand, gills upwards, in small tin boxes, and placing the boxes in a slow oven for two or three hours.—*Wm. Sargant, jun.*

How to Preserve Fungi.—A correspondent in the May number of Science-Gossip wishes to know the best way to preserve fungi. I think he will find the following a good plan:—Take sulphuric acid 2 pints, distilled water 8 pints; mix, and then add creosote 1 pint. Filter through chalk or lime, and again through filtering-paper. Bottle the fungi in this preparation, and tie down tightly. This will preserve them naturally for any length of time without destroying their colour.—*S. J. J.*

Physcia parietina.—It has long been known that the common yellow wall-lichen (*Physcia parietina*) yields to hot alcohol a yellow crystalline principle (chrysophanic acid), which on decomposition by potash produces a magnificent red colouring matter; but it has not, I believe, been hitherto known that this acid is to be obtained in splendid crystalline plates by exposure of the lichen to heat in a covered vessel. A very careful management of the heat is necessary, in order to obtain the best result. If insufficient, there is no product; if in excess, then the acid is entirely sublimed in exceedingly small prisms upon the cover of the vessel; if the heat be exactly of the right degree and kept up a sufficient time, then the acid collects in large plates and spiculæ about the edges of the apothecia, glittering like mica and reflecting every variety of prismatic colour. In this condition the lichen furnishes a brilliant object for the microscope. My mode of proceeding to obtain the proper result is to place a portion of the lichen, furnished with ripe apothecia, in a small porcelain dish or watch-glass, which I cover with a bit of window glass, and then expose to the heat of a small spirit-lamp flame, at a distance of about four inches from the source of heat. The first result, in all probability, will be a deposit of condensed moisture upon the under surface of the cover. This may be wiped off, and the cover replaced. If the heat is now of the right degree, small glittering crystals will, in the course of twenty minutes or so, make their appearance about the apothecia, and gradually increase in size under the prolonged continuance of the heat, until the matter yielding them is exhausted. When a good crop has been obtained the operation should be discontinued, otherwise the product might be too far volatilized. The result is exceedingly beautiful, and will well repay care and patience in obtaining it. These crystals are a delicate test for potash, striking with it a brilliant red colour.—*C. J. Muller, Eastbourne.*

NEW BRITISH FLORA. — Mr. A. Irvine, of 28, Upper Manor-street, Chelsea, is preparing a new work on the "British Plants," giving a condensed summary of the characters of the orders, genera, and species. As he is very desirous to obtain information about all recent additions to the species, and hitherto unpublished localities, he will be glad to receive any assistance on these heads.

OUR MOSS FLORA.—The *Journal of Botany* for July contains an excellent article by Dr. Braithwaite, on "Recent Additions to our Moss Flora," illustrated by two lithographic plates of the new species.

THE AGASSIZ EXPEDITION.—American papers state that the Agassiz expedition, at the latest accounts, was off Sandy Point, Patagonia; and that among the scientific curiosities noted by some members of the party were immense quantities of the largest known alga or seaweed, which grows on those coasts in from 6 to 20 fathoms of water, in vast beds. Patches of this seaweed were passed in open sea, with large sea-lions lying on their surface.

MANNA OF THE DESERT.—Since the appearance of the article in SCIENCE-GOSSIP of March last, I have been informed that the paper read by Mr. Munby before the British Association at Birmingham, in 1849, left an impression (an erroneous one) on the minds of some, that it was opposed to the Biblical account: it may therefore be as well to make a few additional observations, in order to remove any doubts (if such still exist) on the subject. All will admit the manna was miraculously *supplied*, but there is no more reason to suppose that it was not a *natural* product than the water which issued from the rock at Horeb, where the miracle consisted in its sudden *issuing from the rock*, not in the water itself; so with the quails, which were miraculously *sent*, but were natural quails. The statement of Mr. Munby that the lichen *grew up in the night* (although afterwards qualified by the expression "springing up") might, if taken literally, and without qualification, lead to an objection that lichens are plants of slow growth; some lichens, however (the Collemas for instance), are greatly affected by moisture, so that during the heat of the day, in such a hot climate, they would be scarcely visible, while in moist weather they would "spring up," swell, and become prominent objects: such would be the effect of a strong dew. Thus, "when the dew that lay was gone, there lay a small round thing," &c., but "when the sun waxed hot, it melted." (Exodus xvi. 14 and 21.) In like manner the lichens would appear to melt, or, in other words, to shrivel up and almost disappear. An interesting account, and much to the purpose, is given of the lichen by Lindley in his "Vegetable Kingdom." He says: "The *Lichen esculentus* sometimes appears in immense quantities in Persia, Armenia, and Tartary, where they are devoured by the natives, who fancy that they must fall from heaven, not knowing how to account for the prodigious numbers of the plants, of the origin of which they are ignorant." He adds: "Parrott says that in some districts of Persia they cover the ground to the depth of five or six inches, and Eversman, who had an opportunity of studying the species on the rivers Ember and Jaik, and also near Lake Oral, was convinced that, even in the earliest stage of growth, the plants have not the slightest attachment even to a grain of sand, but that the thallus is developed freely, as was at first declared by Pallas. A species or variety has lately been found in large quantities in Algiers; and Treviranus informs us that specimens supposed to have descended from the clouds at Mount Ararat, exist in the Museum of Natural History in the Armenian convent of St. Lazzaro, in an island of that name in Venice. The curious production in question is eaten both by men and animals in the several countries extending from Algiers to Tartary. The individual plants weigh from a few grains to two scruples or upwards even when dry, and when swollen with moisture nearly twice as much."—*B.W.*

"Grevillea."—Under this title has just appeared the first number of a monthly magazine devoted to cryptogamic botany. When we state that it is edited by Mr. M. C. Cooke, M.A., we have given a sufficient indication of its able conductorship. The present number has a most beautiful coloured plate of American Pezizæ, illustrating an article on that subject by Messrs. Cooke and Peck. It also contains articles by Dr. Braithwaite and the Rev. W. A. Leighton; besides additions to British fungi, by Mr. Cooke, made since the publication of his "Handbook of British Fungi."

GEOLOGY.

Fossil Birds.—It is especially the Middle Tertiary deposits which have furnished me with a rich harvest. Thus, in the department of the Allier I have recognized the presence of about seventy species belonging to various groups, some of which no longer belong to our fauna. Parrots and trogons inhabited the woods: swallows built in the fissures of the rocks nests, in all probability like those now found in certain parts of Asia and the Indian Archipelago. A secretary-bird, nearly allied to that of the Cape of Good Hope, sought in the plains the serpents and reptiles which at that time, as now, must have furnished its nourishment. Large adjutants, cranes, flamingoes, the *Palælodi* (birds of curious forms, partaking at once of the characters of the flamingoes and ordinary grallæ), and ibises frequented the banks of the watercourses, where the larvæ of insects and mollusks abounded; pelicans floated in the midst of the lakes; and lastly, sand-grouse and numerous gallinaceous birds assisted in giving the ornithological population a physiognomy with which it is impossible not to be struck, and which recalls to one's mind the descriptions which Livingstone has given us of certain lakes of Southern Africa.—*Milne-Edward's "Investigations on Fossil Birds."*

The Probable Existence of Coal-measures in the South-east of England.—This is the subject of a most elaborate article in the July number of the *Popular Science Review*, from the pen of Mr. Joseph Prestwick, F.R.S., &c., late president of the Geological Society of London. It is illustrated by an excellent coloured map. We refer our readers to the article itself, as an example of clear geological reasoning. The same number also contains a capital article by Professor John Morris, on the "Newly-discovered Fossil Man," illustrated by a lithograph plate.

Collection of Flint Implements, &c. — As some of your readers may at this time be visiting the metropolis, it may be useful to some to know they can verify for themselves facts which before were only presented to them in books. Those who have not seen the interesting collection of ethnology and prehistoric remains bequeathed by the late Mr. Henry Christie should do so at once: a visit will amply repay the trouble. The museum is situate at 103, Victoria Street, Westminster, admission to which is by ticket, available only on Fridays, from ten to four. The tickets are obtained at the British Museum itself on any of the open days on application. The collection (in four rooms) contains prehistoric remains of Europe, Asia, and Africa. The flint implements from the drift are here most beautifully and symmetrically arranged, and you can observe, even from that period, the advance from the rudely-chipped celt to its more polished successor. Daggers, spear-heads, saws, arrow-heads, beside celts, chisels, and gouges, are here all represented. Some from Santon Downham, Norfolk, from Hoxne, Suffolk, the Yorkshire wolds, the Irish celt, axe, and hammer-heads, &c., of their own peculiar type. Most interesting, too, are the remains from the caves of Dordogne, France, consisting chiefly of the animal remains of the mammoth, hyena, reindeer, and horse, some of the bones of the former having the figure of the animal itself engraved on them; of flint and worked bone implements, arrow-heads and scrapers, barbed spear-heads for fishing, and ornaments of fossil shells, with needles from the shank-bones of the horse. These form the most valuable part of the collection. In contrast with them is the ethnographical collection (modern races), and notably in this are the Esquimaux, exhibiting, in the chipped arrow-heads and scrapers of siliceous materials, harpoon-heads, and bone needles, their identity with their prehistoric prototypes. Of special interest are the objects from ancient Mexico, — sculpture, pottery of different kinds, arrow-heads, &c., the most remarkable among which being a mask formed out of a human skull, coated entirely with a mosaic-work of turquoise and obsidian. The eyes are made of iron pyrites, very highly polished, so as to resemble small convex mirrors; the teeth of a white stone, the mouth being made to open; the mask is furnished with straps, so as to be worn. Here are, also, ancient earthen pipes in the form of animals, from the mounds of Ohio, North America, which bring to mind the buried cities of the northern continent, a subject long the wonder of the historic student. In these divisions the ethnologist may study the manners, customs, and dress of the different races of man, shown in their war implements, articles of dress and domestic use, their musical instruments, &c., through tribes from the north-west coast of America, the Asiatic Islands, China, Japan, North and Central Africa, the Polynesian group, all exhibiting the characteristics of the various races. To be brought face to face with the remnants of a vast antiquity, excites in the mind of the spectator a deep and thrilling interest, as he sees in these rude emergencies of almost primitive man the gradual development into higher and still higher types of civilization. The splendid work on "Stone Implements," by Mr. Evans, receutly published, will have given additional zest to the prehistoric branch of this subject.—*S. C. S.*

NOTES AND QUERIES.

Migration of wood-boring Caterpillars.—It was formerly supposed that such species as the Goat (*C. ligniperda*), and the Leopard (*Z. Æsculi*) would not quit the tree in which they were nurtured unless driven from it by some alarm. But recent observers have stated that the Goat caterpillar does thus wander from one tree to another when of considerable size,—a proceeding which certainly exposes it to some danger. The Leopard caterpillar, as I have recently noticed on a pear-tree, leaves its mine occasionally, and crawling to another part of the tree, re-enters it, and drives another burrow. One will thus remain sometimes in close proximity to the bark for awhile, its presence not being detected until the "frass" left behind gradually decays and loosens the bark, and the gap left becomes the resort of earwigs, beetles, and other wanderers of the insect race.—*J. R. S. C.*

Tiniæ destroying Pupæ.—Like others, I have observed various Tiuiæ on the watch for opportunities to deposit eggs in cages; one species in particular, which is not the one mentioned by Mr. Greene (*pseudo-spretella*), but, as I think, the *bisselliella* of modern authors; the *destructor* of Stephens, depositing its eggs on the gauze covering of flower-pots contaiuing pupæ, and the young larvæ dropping to the moss and earth beneath, make their way down to their choice pabulum. Until I discovered their mode of proceeding, I was astonished to find that these moths were emerging from pots and cages which had beeu kept carefully closed from these marauders.—*J. R. S. C.*

Scientific Guide-Books (p. 142).—I think Mr. Warrington's suggestion is a very good one. Many of our guide-books are faulty both in style and arrangement, and few can be called really excellent. As a good specimen of what a guide-book ought to be, I would refer to the Rev. J. G. Cumming's "Guide to the Isle of Man," published by Stanford. It contains not only an excellent itinerary and history of the island, but also an account of the peculiarities of its geology, zoology, botany, and conchology.—*G. H. H.*

Canine Gyrations.—A canine contributor (p. 140) has given us his ideas on this subject, but I do not think he is altogether right. The dogs who "gyrate" most are smooth terriers and other short-haired animals, while shaggy poodles and hairy creatures in general sink down complacently on the mat with which nature has provided them, without any unnecessary evolutions. As for our correspondent "Fido" himself, if there be any truth in Mr. Darwin's theory, we shall soon see him in human, or at any rate in monkey, form.—*E. C. Lefroy.*

Crows.—A lady of my acquaintance resident at Dorking, in Surrey, was very much surprised some mongths ago at seeing about twenty crows sitting on a neighbouring tree apparently in solemn conclave. After an hour's deliberation they all flew away, and shortly afterwards a crow, almost pecked to death, was found at the foot of the tree. Stanley mentious the same thing as occurring in Scotland and the Feroe Islands.—*E. C. Lefroy.*

Two Birds from one Egg (p. 164).—This may well be, for eggs with a double yolk occasionally come to table. Also, poultry-breeders often find a brood with one chick in excess of the number of eggs put with the "sitting." This is sometimes attributed to an additional egg, surreptitiously laid, but is more probably from the double yolk.—*A. H.*

Orchis militaris.—Can any of your correspondents give me privately exact localities in Berkshire, Oxfordshire, or Buckinghamshire, for *Orchis militaris* and *O. Simia?* I shall, of course, not abuse such confidence by playing the part of exterminator.—*R. Payne.*

Separating Spicules.—Your correspondent Mr. R. Battersby finds a difficulty in separating spiculæ from the animal matter of Synaptæ, Holothuriæ, &c. May I be allowed to suggest that, as there are no bone-cleaners like ants, so these minute anatomists might assist your friend in his preparations. By placing the specimens, either in a fresh state or well steeped in water, upou a plate, or some other convenient receptacle, in close proximity to an ant-heap, it is more than probable that he will find his work done for him after a short period, or, at any rate, so far as to render the spiculæ then fit subjects for the boiling in liquor potassæ, steeping in strong ammonia, &c.—*Metcalfe Johnson.*

Charlock.—Under this head, in Science-Gossip of last month, Major Holland has given the name of brassica to *Sinapis arvensis* (wild mustard). It is not a brassica, and, though belonging to the tribe *Brassiceæ*, is no more a brassica than the Diplotaxis, which also belongs to the tribe *Brassiceæ*. (*See* Hooker, Lindley, &c.) Major Holland refers to Sowerby's "English Botany;" in my edition it is called Sinapis, but said to *resemble* brassica. To call it brassica, therefore, tends to mislead the younger botanical readers of Science-Gossip.—*T. B. W.*

Natural History Societies.—In reply to Mr. Davies's inquiry after a Natural History Society somewhere near Clapton, E., I would bring under his notice the East Loudou Naturalists' Society, of which I have the honour of being secretary. It was founded in 1870, and is now in a thriving condition. I shall be happy to furnish him with all particulars on application to 23, Fairfoot-road, Bromley-by-Bow, E.—*John W. Love.*

Caterpillars in Confinement.—I think "J. R. S. C." would find the following plan preferable to the usual way of keeping caterpillars. Get two flowerpots, or boxes if he prefers them, one of which will slip not halfway into the other. Into the bottom one he can put some earth, moss, and damp sand; then he can put the stalks of the plants on which he feeds the caterpillars through the hole of the top pot, into which he can put the animals, and cover with glass. A small bit of nitre will keep a plant fresh a good deal longer dissolved in water.—*E. T. S.*

Saffron to Birds.—With reference to the question of "J. R. S. C.," it may be asserted that saffron is certainly an aromatic, and is also slightly stimulant. The administration of saffron to birds during moulting is founded on a theory that at this period the bird should be in a kind of fever, such increased state of excitement and heat being necessary for the proper performance of the function of moulting. From some cause, as that the bird is debilitated, or the weather is cooler than usual, there is not a state of vigour or sufficiently increased excitement to carry the bird safely through the process. A "chill" is given, the falling-off of the feathers is checked, a retrocession takes place, some internal organ is attacked, and the bird sinks either from exhaustion or from the new induced disease. Such is the theory. But "fanciers" differ in the diagnosis and treatment of the diseases of birds as much as doctors do concerning those appertaining to man. Some give in this case saffron as a stimulant,—of very small power, as "J. R. S. C." has pointed out, when administered in the usual manner. Others place a nail in the drinking-water, so that it may rust, believing that if the bird swallows the minute quantity of protoxide of iron which may be diffused throughout the water, a tonicity of system may be acquired sufficient to carry it through the change, which, after all, is but a natural process, becoming unhealthy only under certain conditions. —*Henry J. Bacon.*

Where are the Swallows?—I have watched for them in their old haunts over Hampstead Heath, near the ornamental water in the parks, &c.; but even near Bishop's Wood, where they formerly congregated in numbers, I have seen neither swallow, martin, nor swift this year. Are they scarce in other parts of England, or have they simply forsaken the north-western outskirts of the metropolis?—*E. M. P.*

Whales in Garrans Bay, Cornwall. — I copy the following from the *West Briton* of June the 20th:—"On the 12th instant the appearance of a curious sail in the bay attracted the attention of fishermen, and one of them, on getting nearer to it, found it to be the dorsal fin of a whale; so he deemed it prudent to give it a wide berth. About three months since a young fisherman, when in the bay, saw passing by him a whale with a young calf on either side of her; but she was very pacific, and apparently sought only her own and infant's security. This is the first appearance of whales here for the last ten or twelve years. Those that were previously accustomed to frequent for some years the Cornish coast, were found dead about ten years since: one was found in Garrans Bay, and the other was towed into Falmouth harbour." — *H. Budge.*

Scarcity of Butterflies in 1872.—Being in Kent through the first half of June, I was rather surprised to find how very scarce butterflies were, and one greatly missed these ornaments of the landscape. Even on bright days there were few about, except Whites, and the disappearance or retardation of the rest must, I presume, have been caused by the cold nights (and days also, not unfrequently), and the heavy rainfall in part of May and June. The Small Tortoiseshell, frequently abundant in June, only exhibited itself now and then; of Meadow Browns and Walls there were only solitary specimens here and there; while nearly all the hybernated Brimstones were extinguished; and instead of common Blues appearing by the dozen, as is often the case, I believe I only saw three or four. The Large Skipper was not about, though the small species (*Linea*) began to come out the second week. A few battered Fritillaries were about in the woods, remnants of the brood of *Euphrosyne;* but the most abundant species (though local) was the Small Heath.—*J. R. S. C.*

Montagu's Harrier.—The notice of this bird in last month's Magazine reminds me of some facts connected with one which was shot near Guildford last spring. For three or four years the keeper had said that a large grey bird came over the farm about the same time every year; he did not know what it was, and the men called it the Grey Kite. In 1872 I saw it when out with my gun one day: it was flying low by the hedge, and I was unable to get near enough to see what it was; the following year it appeared again, this time coming within range of the keeper, who killed it; when it turned out to be a Montagu's Harrier in the grey plumage of the adult. It seemed always to be flying in a southern direction. Can any of your readers give any explanation of this circumstance? Is it that they are migratory birds, and would be going south at that time of year?—*J. L. C.*

Bees.—Having lost all my bees this spring, I placed, a few days ago, two hives half full of empty comb to dry, inverting one and setting the other upon it, so that they were placed mouth to mouth, the upper one projecting over the other a little in front. On July 5th I was surprised to see a score or two of bees flying about the opening, but supposed them to be seeking some remains of honey which might be left. About half an hour later I went up the garden, and found that a large swarm of bees had settled on the outside of the hive, and were rapidly ascending into the upper one; and I now have them on my stand. None of my immediate neighbours keep bees, as I believe, therefore these must have travelled some little distance; and the bees I first saw must have been pioneers seeking a suitable home. If they came with the wind, they must have topped a hedge eight feet high, at the foot of which the hives were placed, and at only a few feet distance in the other direction were some tall peas; so that they must have flown at some height and dropped suddenly down to the hive.—*Arthur R. Graham.*

The Hawfinch.—Perhaps one or two additional facts respecting the occurrence of this bird may still be interesting, although the evidence adduced in several recent numbers of Science-Gossip seems to show that it is not so rare as was by some correspondents supposed. About the beginning of May a deserted nest of the Hawfinch, containing six eggs, was brought to me from a neighbouring orchard. The situation, which I afterwards saw, was a very conspicuous one,—on a horizontal branch of an apple-tree, about twelve feet from the ground. The old man who took the nest, and who is well acquainted with the nidification of the neighbourhood, had never met with one of the kind before; but the bird was not strange to him, and he had seen several of them during this spring. I have since learned that the nest has been found on more than one occasion in the garden of a gentleman of this place, and that on one at least of these occasions it was, like the one I have, conspicuously situated in an apple-tree. I learn, also, that four young hawfinches are now to be seen together, engaged in plundering green peas; so that at least two nests of the species have been built here this season. Moreover, the bird has been repeatedly shot hereabouts. I am acquainted with several preserved specimens. I may add, as showing the likelihood that the Hawfinch is pretty generally diffused, that, on my casually mentioning the subject to a Lancashire friend, he replied that in a narrow space in his own locality one or two nests are found every year. Perhaps the nest is not found so often as, from the frequency of the bird, might have been expected. If this is so, I should be prepared to hear that it is not always built in such an exposed situation as those to which I have referred. It is, however, a large nest, including a broad foundation of twigs; and the general testimony of writers seems to be that the situation is usually an exposed one. — *B. P. P., Haslemere, Surrey.*

The Bite of the Stag Beetle.—Might I add the following extracts to the correspondence which has appeared in your Magazine on this subject? The Rev. J. G. Wood says: "The female is, as far as regards the shape of the body, like the male, but her jaws are very different in form, being much smaller, curved, and sharply pointed, as any one can testify who has been bitten by them. The male can pinch very severely with his enormous mandibles; but the female bites much more viciously, as I can testify from much personal experience of the bites of both sexes." And in "Insect Miscellanies" Westwood says, regarding them: "The size (of male and female), however, is not the only distinction, for the female possesses little more than the rudiments of the very remarkable horn-like mandibles with which the male is furnished. This organ in the male is no less formidable than it appears, as the unwary school-boy often experiences: for it can be used as a pair of pincers, so powerfully as to inflict considerable pain." The above, and all the notes which have appeared in the Magazine, lead one to the conclusion, I think, that stag beetles do not bite unless in self-defence, and only occasionally then, as I have handled them without their attempting, when I gave them the chance.—*J. L. C.*

Green Lizards.—I opened a green lizard, which, from a few hairs in the mouth, I presume was killed by the cat in my garden. As is well known, this species snaps sharply at the fingers if touched, though it cannot inflict a wound. The poor little creature I knew was in an "interesting" condition, and in fact the whole cavity of the body, from the sternum to the anal orifice, was occupied by eggs, thirteen of which averaged $\frac{6}{8}$ths of an inch in length, by $\frac{3}{8}$ths in breadth. The liver and digestive canal were almost literally nowhere. The length of the cavity was three inches. I am sorry to say that dealers are advertising here for green lizards. — *Rev. J. J. Muir, Jersey.*

The Influence of the Moon upon Lunatics (p. 117).—Modern science refuses to recognize this, though the belief is of very considerable antiquity. And yet, so far as I am aware, no observations of importance have been made by those having opportunity to give a fair test to the supposition. It is an unquestionable fact that in most of the forms of insanity there are changes more or less periodic in the condition of the patient. The old idea which has been variously stated, however, was, I believe, to this effect: that lunatics were better at the new moon, and worse at the full. There is a passage somewhere in Byron, which I cannot precisely remember, referring to this, as an opinion existing amongst Orientals. Dr. Leslie thinks, from his examination of the Syriac and other versions of the Scriptures, that the "lunatics" mentioned in the New Testament were "sleep-walkers," who, through some disease of the brain, were led to wander about by moonlight over the flat roofs so common in Eastern houses.—*J. R. S. C.*

Irritating Effects of Caterpillars' Hairs.—The only larva I have ever found to have this irritating property when handled is that of *B. Rubi*, the Fox-moth. It is an insect that I have taken much pains in breeding and have been very successful with, but always have needed to handle them with care. On one occasion the place broke into an open sore, and continued for some months to heal and break open again. Lately, when I have been handling them, I have singed my fingers over the gas or a match before touching anything, and have felt no inconvenience since I adopted that plan. The skin at the finger-ends appears too thick for the hairs to penetrate far enough to irritate, and it is only when they get to some more tender place that they affect it injuriously. They must penetrate with either end, for they will leave the finger-ends for any other part that may be touched. I have handled *B. Quercûs*, *A. Caja*, *auriflua*, and many other "hairy worms," but never found any other species than *Rubi* to have this irritating effect.—*John E. Robson, Hartlepool.*

Larvæ of the Small Eggar (*E. lanestris*).—It always appeared to me that this larva was unable to move without the thread coming from them; that the "spinning" was an involuntary act; and thus, as they crawl about for food, the web is spun. As the leaves are eaten in immediate proximity to the place where they were hatched, they have to go further for food, and the web is gradually extended with their wanderings. After the last moult this involuntary emission of the web seems to cease. They then separate and wander away from each other; a wise provision, necessary for the preservation of the species, as otherwise they would all spin their cocoons in one place, and be more liable to destruction.—*John E. Robson, Hartlepool.*

Skeleton Leaves. — I shall feel very much obliged to any subscriber who will kindly inform me the right time to gather leaves in order to obtain their skeletons; also the best method of preparing the skeletons, and of preserving them when obtained.—*L. V. H.*

[See article in February number on a "Simple Method of Preparing Skeleton Leaves."—Ed. S.G.]

"Moth among Clothes."—Seeing no one has answered the appeal respecting the destruction of these insidious pests, I would advise your correspondent that the first desideratum is a box with a close-fitting lid. Nothing else will serve the purpose of keeping out the moths for any length of time; for where they cannot get in bodily, they will thrust in the ovipositor, and deposit their eggs. To destroy the larvæ and moths, if they have entered, benzole will be found the most efficacious. This may be sprinkled over the apparel. If, as before mentioned, the lid is well-fitting, the benzole will retain its influence for a length of time. If economy is an object, rags saturated with turpentine, alone or mixed with benzole, may be placed in a corner of the box. It need hardly be stated that a light should not be brought near the box when first opened, as the vapour of benzole is highly inflammable, but soon passes off.—*H. J. B.*

Cleaning Feathers.—Can you, or any of your readers or correspondents, inform me of any means for cleaning the feathers of stuffed birds from dust, accumulated by too long exposure in an unglazed case? The bird I more particularly refer to is the Duck (long-tailed).—*W. R.*

Worms in Fish.—The following curious phenomenon came under my notice a day or two since:—A large well-favoured looking, and perfectly fresh grey gurnet was served up at our table for dinner; and on the first flake being taken from the back and put on a plate, there appeared a long tapering red creature, which soon showed itself to be a worm. As this circumstance rather shocked those who were at the table, of course the fish was removed, and we concluded that the worm had proceeded from the parsley, with which, *de more*, the fish was garnished. On further examination below-stairs, however, it appeared that the whole of the vertebra of the spine was thick with these wretched little, long, hairy worms. The fishmonger says he has never seen a parallel case. The circumstance seems so remarkable, that I am induced to trouble you with this letter. The presence of these worms appears clearly to indicate disease, though, as far as I know, not Trichinæ, as they are, I believe, infinitely more minute reptiles. If the fish had been dead long enough to breed worms,—first, it would have smelt very strongly; and secondly, the maggots would not resemble one I send, which is one of the remarkable little reptiles found. If any of your readers could throw a little light upon the subject, it would much interest and greatly oblige.—*H. Dent.*

Plants applied to Ornament.—Being at present engaged on a work on ornamental art, I am desirous of referring to as many examples as possible of the use of our wild plants in old stone carving, illumination, &c. Some of my own entries will perhaps better illustrate what I mean than any more lengthened description. "Oak, leaves and acorns, small but good, a capital at Ely"; "Hazel leaves and nuts, naturalistic in treatment, hollow moulding, Winchester"; "Borage, naturalistic, 16th century MS., British Museum"; "Bindweed, leaves at end of stalls, Wells Cathedral"; "Periwinkle, 16th century MS. in British Museum"; "Columbine, on a brass, Exeter Cathedral." If any of your numerous readers will kindly help me, I shall gladly avail myself of their assistance. I shall be glad to know the source from whence the example is derived; as stone or wood carving, stained glass, &c.; whether naturalistic or conventional in treatment, and, in fact, any information respecting the example referred to, that my correspondents may feel at all interesting. As I can scarcely hope that this would be a matter of general interest, those who are able and willing to assist me will perhaps kindly address to me direct, rather than through the pages of Science-Gossip.—*F. E. Hulme, F.L.S., F.S.A., Marlborough.*

The Cuckoo.—In Science-Gossip for July, Mr. C. A. Rowley gives some notes on the Cuckoo. His observations, however, are quite different from any I have heard before, as I never heard of or saw an old cuckoo frequenting the locality where its young one was hatched. Cuckoos are very common in the whole of Munster and Connaught, especially in the hill countries, and numbers of the young ones may be seen in July and early August; yet at that time the old birds seem totally to have disappeared. I have seen hundreds of young ones, but never remember to have remarked an old one in their season. The advent of the Cuckoo is most marked: for miles along a coast-line he will be heard on the same day, and during the next week or fortnight these will scatter over the adjoining inland; but where do they go? The hills in this neighbourhood were alive with them a month ago, but I have only seen one during the last week; and although I have watched and watched, I never could find out what becomes of the young ones. The latter may be seen in August with their foster-mothers, while the corn is being cut, but after that they mysteriously disappear. A young cuckoo has a most peculiar tongue, like a table on an ingeniously constructed level. It does not feed, like other young birds, by opening its mouth to let the food be dropped in, but it shoots out the table for the food to be placed on it. They are very easily reared, and make good pets; but unfortunately it is hard to keep them through the winter. All mine suddenly died without apparently any cause. Any one interested in the Cuckoo will find a great number of facts about it published in *Land and Water* about two or three years ago.—*G. H. K., Kylemore.*

Plants and Gaslight.—It is a most mistaken notion to suppose that gas kills plants simply and solely because its light disturbs their natural rest, and prevents them from going to sleep; a view I see enunciated in this month's Gossip. I very much doubt whether gaslight has any such effect, as its chemical action is very different to that of sunlight, which we all know has such important influence on the life of plants and the elaboration of their food. Be that as it may, I think we must ascribe the destruction worked on growing plants by gas neither to the light nor to the increased heat, but to the deleterious products of its combustion, which, in the absence of thorough ventilation, vitiate the air of dwelling-rooms and render it absolutely poisonous. This effect would not result to the same extent if the gas we use were pure carbides of hydrogen, which in burning consume oxygen, the product being only carbonic acid gas and watery vapour. One has only to turn to Mr. Leicester's Paper on Waste Products (p. 131), to find mentioned a few of the contaminations of coal gas: these are by no means entirely got rid of in its purification; so that when at last it issues from our burners, there are let loose, to spread destruction and death amongst our books, pictures, and flower-pots, to say nothing of our lungs, compounds of sulphur, sulphuric acid, ammonia (with it may be a little cyanide or prussic acid), and goodness knows what besides. *Moral.*—All ye who cultivate window-gardening in handsomely furnished apartments, be content with good moderator lamps, and let gas have the landings, staircases, and servants' offices. —*Jas. W. White.*

Seals.—On June 1st a seal, measuring six feet, came into the river at Cushendun, and was fired at by the coast-guard. It is twenty years since a seal was seen in this locality. It was killed the same evening at Cushendall, four miles further south, by a coast-guard, whilst it was basking on the strand. —*S. A. Brenan, Clk., Cushendun, co. Antrim.*

NOTICES TO CORRESPONDENTS.

All communications relative to advertisements, post-office orders, and orders for the supply of this Journal, should be addressed to the Publisher. All contributions, books, and pamphlets for the Editor should be sent to 192, Piccadilly, London, W. To avoid disappointment, contributions should not be received later than the 15th of each month. *No notice whatever can be taken of communications which do not contain the name and address of the writer*, not necessarily for publication, if desired to be withheld. We do not undertake to answer any queries not specially connected with Natural History, in accordance with our acceptance of that term; nor can we answer queries which might be solved by the correspondent by an appeal to any elementary book on the subject. We are always prepared to accept queries of a critical nature, and to publish the replies, provided *some* of our readers, besides the querist, are likely to be interested in them. We do not undertake to return rejected manuscripts unless sufficient stamps are enclosed to cover the return postage. Neither do we promise to refer to or return any manuscript after one month from the date of its receipt.

R. H. W.—We cannot insert mere lists, either of plants or insects.

T. M. H.—Tobacco-water, or strong soap-suds, may be advantageously used for destroying the blight on rose-trees.

A Subscriber.—Your query about lightning-conductors does not come within our province. Inquire in the pages of some journal devoted to mechanics or physical science.

S. A. Stewart.—The moss is *Hypnum filicinum*.

Will some of our courteous, but eager, correspondents, remember the inexorable limits of *space*, and that it is impossible to publish more than our monthly columns will allow? We cannot depart, except under very special circumstances, from the rule of priority in contributions.

Rev. R. B. C.—See zoological paragraph in last Science-Gossip on "Fish building nests."

Constant.—See "Half-hours by the Sea-side," just published. Hardwicke, 192, Piccadilly.

L. V. Hamel.—You will find all the instruction you need in an article published in the February number of Science-Gossip, headed, "A Simple Method for Preparing Skeleton Leaves." We thought that as this was so recent, you must have seen it.

W. Aldridge.—See paragraphs in present number on drying fungi. Most of the treatment is applicable to gourds.

John Shepherd.—Any good bird-dealer will get you a blackcap warbler.

Rev. B. B. C.—See paragraph in the zoological column of last number of Science-Gossip.

C. R. W. Nursey.—The supposed Foraminifer seems to belong to the genus *Dactylopora*; but your sketch shows no pseudopodal apertures. An actual examination will be necessary to determine its nature.

T. G. Darling.—The larva in the pear sent appears to be that of one of the small Gall-gnats, or Midges (*Cecidomyia*). Most likely it also feeds on the fruit of the hawthorn, by which its abundance is kept up. The only plan of destroying it would be by lighting weed fires near the trees at the time of blossoming.

J. C. D.—Mosses: No. 1, *Hypnum serpens*; No. 2, *Dicranum pellucidum*.

A. P. Jones.—The specimens of mites (mounted) had all been distributed before your application.

H. A. Allingham.—You should have sent the leaves of the plants, as well as the flowers, both packed in wet moss. The latter were sadly withered. No. 1 is *Ajuga reptans*; No 2, *Polygala vulgaris*; No. 3, *Geranium molle*; No. 4, unidentifiable.

K. D.—Your plant is cow-wheat (*Melampyrum pratense*).

Bryum.—A, *Sphagnum neglectum*; B, *Autacomnium palustre*; C, *Bryum pseudotriquetrum*.—B.

F. C. Fox.—The fern sent is the Bladder-fern (*Cystopteris fragilis*).

Answers Deferred.—W. A. Luff.—C. F. W.—G. E. X.—H. P.—Louisa.—Edwin Smith.—W. E. Sharp.—E. T. S.—J. Henderson, &c.

EXCHANGES.

Well-mounted slides for the microscope, comprising Cluster-cups (*Æcidium Epitobii*), polariscope objects, entomological preparations, &c., in exchange for other good specimens. Lists exchanged.—J. Ford, Hamford.

Mounted objects including rare Acarus (*Actysia Dytici*), various parasites, and other objects of interest.—Send list W. O. Nicholson, Brigg.

Well-mounted fossil Diatomaceæ from Oran, Algiers, for ditto from Mull, Bermuda, or Algoa Bay.—H. B. Thomas, 13, Market-place, Boston.

For Dendritic spot on paper send stamped envelope and object to G. Booth, 14, Market-place, Chesterfield.

Wanted Silurian Trilobites in exchange for Carboniferous Trilobites.—S. Barningham, Arkingarthdale, Richmond, Yorkshire.

For seed of *Antirrhinum majus* (unmounted) send stamped directed envelope to P. Smith, Legh Street, Warrington.

Wanted Foraminifera (mounted in balsam), also sections of teeth (mounted). Good named slides given in exchange.—E. Lovett, Holly Mount, Croydon.

Eggs or Worms of *B. Cynthia* offered for microscopical slides.—S. H. Gaskell, Edgeley, Stockport.

Elateritr, Calcite, Fluor, and other Derbyshire minerals, for foreign, Cornish, or Scotch Minerals.—Rev. J. M. Mello, Brampton, St. Thomas's, Chesterfield.

Wanted, in exchange for a mounted specimen of larva of *Aphrophora spumaria*, a Wing-case of Green Weevil, well mounted in balsam.—Address, sending the object and stamped envelope, W. Sargant, Jun., Caverswall, Cheadle, Staffordshire.

Palates (mounted) of *Helix*, *Limax*, *Patella*, *Buccinum*, *Littorina*, &c., in exchange for objects, mounted or unmounted.—Alfred Guthrie, Ward Road, Dundee.

Wanted, Hair of Indian Bat (mounted). Two good slides offered in exchange.—E. Lovett, Holly Mount, Croydon.

British Lepidoptera for Coleoptera and birds' eggs.—E. C. Lefroy, 2, Granville Place, Blackheath, S.E.

Wanted, the fish or the skin of a Perch and Carp, for first-class microscopic objects.—E. W., 48, Tollington Road, Holloway, London, N.

Wanted, a number of living specimens of the Hornet (*Vespa Crabro*). Postage will be paid. Offers, if accepted, answered in a week.—W. D. Roebuck, 81 and 82, Briggate, Leeds.

Foreign and British Shells in exchange for Fossils.—J. H. Frogley, Market-place, Wantage.

Tubifer *rivulorum*, and spicules of *Grantia compressa* for other good mounted objects.—J. C. Hutcheson, 8, Lansdowne Crescent, Glasgow.

A Quantity of British Birds' Eggs for exchange. A list will be sent on application to G. C. Davies, 8, St. Andrew's Street, Norwich.

Asbestos, mounted for polariscope, offered for other well-mounted objects.—J. Sargent, Jun., Fritchley, near Derby.

Sisyrinchium *anceps*. Dried and living specimens obtained at Woodfard, Galway, the only known old-world locality for very rare British plants.—R. M. Barrington, Fassaroe, Bray, county Wicklow.

Wanted, mounted objects in exchange, or for foraminiferous and diatomaceous material, &c.—J. A. Perry, 42, Spellow Lane, Liverpool.

Larvæ of *B. Cecropia* and *B. Cynthia*, to exchange for any good lepidopterous larvæ for rearing. *A. atropos* preferred. T. Shipton, Jun., 12, High Street, Chesterfield.

For spores of a *Lycopodium* send stamped and directed envelope to J. H. Martin, 86, Week Street, Maidstone.

Arenarsia *uliginosa*, *Lathyrus tuberosus*, and Nos. 17, 763, 887, 1203, S.-C. for any of the following:—Nos. 90, 307, 376, 483, 651, 863, 876, 942, 1049, 1111, or 1242.—Dr. F. Arnold Lees, Hartlepool, Durham.

BOOKS RECEIVED.

"Grevillea," a monthly record of Cryptogamic Botany. No. 1.

"The Journal of Botany." July.

"Entomologists' Monthly Magazine." July.

"Boston Journal of Chemistry."

"The American Naturalist."

"My Garden." By Alfred Smee, F.R.S. London: Bell & Daldy.

Communications Received from—E. L.—W. S.—R. P.—M. J.—T. B. W.—F. E. A.—W. H. P.—A. H.—E. T. S.—B. W.—J. H. G.—K. D.—G. B.—H. B. T.—G. C. D.—T. S.—J. F.—Dr. F. A. L.—W. O. N.—H. B.—H. J. B.—B. P. P.—E. M. P.—A. R. G.—J. L. C.—W.S.—J. H. J.—J. F.—M. A. W.—C. J. M.—P. S.—S. B.—C. R. W. N.—C. T. J.—J. H. F.—W. D. R.—R. Y. G.—E. R. H.—W. B. C., &c.

COLLECTING AND PRESERVING.

No. VIII.—FUNGI.

By Worthington G. Smith, F.L.S.

WITH the fogs and rains of autumn the fungologist's harvest begins. A few fungi (large and small) appertain to the spring, and some species may be found in every month of the year; but it is not till September has well set in, or October is reached, that the glut of fungi is really upon us. Fungi may generally be met with in abundance for three months of the year; viz., from the latter half of September till the middle of December, the month of October taking pre-eminence for producing the greatest abundance of species. A season of moderate heat and rain is the most productive, for an excessive amount of either dryness or moisture appears to destroy the fecundity of the mycelium, which it must always be remembered is alive and at work (underground) the whole of the year; for, as a matter of course, this year's fungi is produced from last year's spores. These spores are set free in autumn, and at once vegetate and form masses of mycelium, from which next year's crop must spring; just as the seeds of our wild annuals are self-sown at the fall of each year and first germinate at that season. It is a great mistake to suppose that Agarics and Boleti wait till the leaves fall, so that they may prey upon them; for, as a rule, the larger fungi never live upon the leaves of the same year as that in which they (the fungi) come up; fungi live upon the fallen leaves of the previous autumn. The spring and summer months will sometimes prove very productive, especially after stormy weather; but the collector must always bear in mind that fungi, like all other things, have their *seasons*. I have known the fungus-harvest quite over by the end of August, and I have also known it not come in before December: it depends entirely upon a certain amount of atmospheric heat and moisture. A damp summer and stormy August will produce the crop at the beginning of September; but a dry autumn, without much rain till November, will delay the fungus-crop till Christmas. Some species appear regularly *twice* a year from the same mycelium; once after the rains of March and April, and again in October. This is the case with *Coprinus atramentarius*, which I have growing (originally from spores) in a bed of my own garden.

It is useless to go out specially to collect fungi, either during the dry hot weather of summer or the frosts of winter: it sometimes, however, happens, that odd fungi may be found here and there, in out-of-the-way places, such as the sides of open cellars and sawpits, under bridges, on prostrate logs in streams, in damp outhouses, or about old water-butts, &c.; therefore I never go out without two or three old seidlitz-powder boxes, some thin paper, and a strong knife, in case any waifs and strays should fall in my way. I have sometimes found good species in a friend's dust-bin or cistern, or upon the sides of a public-house open cellar. I once found an agaricus on the cornice of London Bridge, to secure which I had to get over the parapet, and was nearly being taken into custody as one tired of life; another time I found a colony of *Coprinus domesticus* upon a friend's scullery wall, and a *Peziza* upon my brother's ceiling. Moral: Fungologists' pockets should, *at all times*, contain one or two small boxes for securing stray and erratic members of the fungus family.

The equipment for a fungus foray differs with the nature of the fungi to be collected. If the plants sought for are wholly microscopic, a small vasculum, knife, pocket-lens, and package of thin paper will be found sufficient; but if Agarics, Boleti, the larger Polyporei, &c., are to be brought home, a more complete set of things will be required, which should include a very small garden-trowel or carpenter's gouge (any saddler or bootmaker will make a suitable leather case for the blades for a shilling or two), a strong knife—such as gardeners use for pruning trees, a few sheets of thin paper, a lens, pocket-compass, and some string. If truffles are desired, a rake is necessary, and the best plan is to carry the iron-toothed end separately in a leather case and made to screw on to the end of a walking-stick; when not in use, this end can be carried in the pocket with the trowel, &c. It is requisite that the vasculum be large, with straps to carry it over the shoulders; and the collector should be provided with a set of cardboard boxes, large and small, to go inside the vasculum, and to contain the more delicate or choice spoils of the day. Leather gloves and a thin great-coat are good things for the chilly days of early winter—this coat should be provided with at least four large pockets; and, if the weather is inclement, strong boots and waterproof leggings will be found serviceable. An old felt hat and large cotton umbrella are also desirable, for it is only a piece of folly to go into the wet dripping woods with good clothes. As for the umbrella, it should be one of the Mrs. Gamp pattern, of good size, and with a (removable) ring at the end furthest from the handle, so that it may be suspended from branches of trees, &c., whilst the fungi are sorted or examined below, or a frugal luncheon is discussed (perhaps during a passing storm of rain). The string will be found useful for tying up the larger Polyporei; these are frequently of great size, and often weigh many pounds. In collecting, all Agarics should be kept separate as much as possible; for this purpose thin paper, such as is used by stationers and milliners, is indispensable; every specimen should be wrapped very lightly in a piece of thin paper before boxing, as the elasticity of the paper not only prevents breaking and bruising, but it also prevents the spores of one species being scattered over another. In carrying fungi about, or sending fresh specimens from one place to another, nothing is so good as this thin paper interspersed here and there with fronds of the common bracken. Sawdust, hay, or wool, should never, on any account, be used: such things totally destroy the plants; but with careful packing with paper and bracken-fronds, fungi may be transported for any distance, by rail or otherwise, perfectly intact and undamaged. In packing the vasculum, see that the heavier plants are at the bottom and the lighter ones at the top; for if packed otherwise any fragile species will be certainly destroyed. I have known a good collection of Agarics rendered worthless by a loose puff-ball being placed with them, which has rolled about with every movement of the collector's body, and damaged big and little species alike, when a piece of paper or a fern-frond or two, to prevent rolling, would have kept all quite safe.

It is hardly necessary to specify localities, because fungi abound everywhere. If leaf fungi are sought for, hedge-sides will produce an abundant crop; if the Agaricini and Polyporei, forests and woods must be ransacked; if the edible species are wanted, rich open pastures (with few exceptions) must be traversed: the various species of truffles must be looked for principally in leafy glades—many like a calcareous subsoil, but at times they may be met with even in hedge-sides, town parks, or elsewhere.

When the collection of the day is complete, no species must be allowed to remain in the collecting-cases all night; for if the boxes are not carefully opened and the contents laid out, it will probably be found in the morning that some will have dissolved into an inky fluid; others will have got into the treacle state, whilst a third lot will be overrun with mould, or the smaller ones perhaps entirely eaten up by slugs or larvæ. Few things decompose so rapidly as fungi, especially the fully-grown Boleti: these, though apparently perfectly sound one day, will sometimes be a horrible mass of fœtid treacle the next. I have sometimes received large parcels by rail or post when this horrible stinking matter has been dripping out, perhaps all over the carter's hands or down the postman's trousers; for *ladies* always *will* send Boleti in bonnet-boxes, tied with thin twine. Should any extra charge be demanded, on the ground of the insufficiently prepaid postage, or the parcels be unpaid, I invariably refuse to take them in, to the disgust of the parties bringing them. I shall not soon forget an ill-tempered postman who brought me two of these dripping treasures at the same time last autumn, with a demand for extra postage, and his look of silent disrelish as he walked off with one twine-suspended bonnet-box in each hand, the fragrant Boleti-treacle meanwhile manifesting itself upon the pavement. Even when quite fresh, the odour of some species is disgusting in the extreme; for instance, a single specimen of *Phallus impudicus* in the collecting-box will infect a whole railway-carriage with the most horrible and sickening stench; whilst the curious truffle *Melanogaster ambiguus* is perhaps worse still, for its abominable odour is perfectly insufferable.

To dry and preserve a collection of fresh fungi is at times a very difficult task; for instance, some species are so entirely covered with a tenacious gluten that if they were at once put between drying-papers, it is certain they would never come out again with the least chance of being recognized by even the most acute fungologist; others are so deliquescent that in an hour or two they would dissolve into a watery mass, soak through all the paper, and leave a mere dirty stain between the sheets where the plant was originally placed. As a contrast, some of the Polyporei (as the young state of *Polyporus igniarius*) are so hard that nothing but a steam-hammer would have any chance of flattening them. There is considerable difficulty in ridding the plants from the larvæ with which they are often infested. A few drops of the oil of turpentine will, however, generally drive them from Agarics and other fleshy fungi; and, in regard to the woody Polyporei, a good plan is to place the plants in an oven, or on a hob for a short time, where the heat is not too powerful to destroy the plants, but still sufficiently potent to drive the larvæ from their holes. If this is not done, the collector's experience will probably be the same as mine has more than once been; viz., on opening a package (which should contain some choice dried fungus), to find only a stain, a few skins of dead maggots, and a little dirt—in fact, some of the species in my herbarium, though mostly poisoned with corrosive sublimate, get entirely devoured by rapacious and poison-proof larvæ, mites, and minute beetles.

In addition, however, to the mere drying, certain notes and particulars are required, without which the best dried specimens are worthless; and, again, for the larger fungi to be of real service, the spores of each species must be separately preserved. As regards the drying of the fleshy fungi themselves, the process to observe is as follows:—Lay all ordinary Agarics out separately in a dry place, or in a current of dry air from six to twelve, or even twenty-four hours, according to the species, so that they may part with their superfluous moisture, and thus facilitate drying. In the case of species with glutinous pilei, it will be found that the gluten will more or less set, if carefully attended to, in a dry, warm place. If the larger fleshy fungi are inadvertently placed under a propagating-glass, or left on a lawn or grassy place, or kept in damp air from over-night till next morning, the chances are that they will never properly dry at all. When the superfluous moisture has evaporated they may be put gently between drying-papers, but the weight put upon them must at first be of the slightest kind; ordinary books, more or less light, will be found quite sufficient; and few, or perhaps no other plants, require such frequent changing as Agarics. An hour, or often less, suffices for the first pressure, when care must be taken to supply them with fresh and perfectly dry paper, or they will immediately mould. It is a good plan, when the plants are half dry, to take them out of the papers and put them in dry air, or in a sunny place for a short time (the length of time being determined by experience and the nature of the species), to part with more of their moisture: so, with constant attention and frequent changing of the papers, very presentable specimens may at last be obtained. These dried fungi will now be found very useful for showing the more superficial characters of the plants; but without sections, spores, and proper notes, they will be next to useless. In Agarics it is of the first importance to show the nature of the attachment of the gills to the stem: and should the stem be furnished with a volva or annulus, this must be preserved with the greatest care—young specimens, too, in different stages of growth, are often of great value.

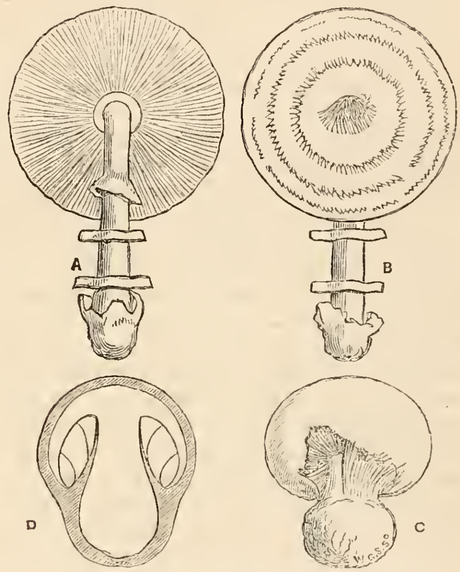

Fig. 121. Specimens showing the gills, rings, and stages of growth.

If possible, it is well to have a series of dried specimens of each species, one as in fig. 121: A will display the nature of the tubes in Boletus and the gills in the Agaricini, whether they are thick or thin, crowded together or distant from each other, plain or serrated, free or adnexed; another, as at B, to show the pileus, whether smooth or floccose, plain, warted, or zoned, and the nature of the margin, whether striate, bullate, or plain; a third, as at C, to show the attachment of pileus to stem in infancy; and, fourthly, a section or thin slice removed from the exact middle of the young plant from top to bottom, as at D: this will show the nature of the veil (if present), and whether universal or not; and if absent, whether the margin is at first straight, incurved, or involute. A similar section through the mature plant is also required, E and F (fig. 122): this will give the attachment of gills to stem (a character of great importance), and the nature of the stem itself, whether solid, stuffed, or hollow. Great care and experience is required to cut a thin aud perfect slice from the middle of a tender Agaric or Boletus; for there is often a sort of articulation at the point G, which causes the slice to fall in two. As for preserving fungi in fluids, I think it in all

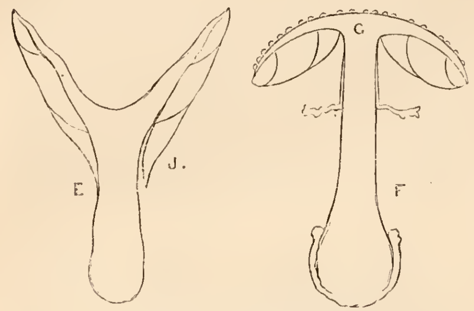

Fig. 122. Section cut through Agaricus.

ways undesirable. It may more or less answer for single or unique specimens, or for large museums, where space is of no consequence; but for all purposes of constant reference and private study, any process of this sort is worthless. Few persons, I imagine, would care to have hundreds (or I might say thousands) of tolerably large glass bottles of fluids in their houses. It is essential that the spores should be secured, as their colour and size is very important. They may be preserved in various ways: if coloured, they are best kept on white paper, and if white, on black glazed paper, such as is supplied to photographers; or they may be at once deposited and kept on glass slides and covered, or between thin sheets of mica, also such as photographers use. I prefer the spores free on paper,

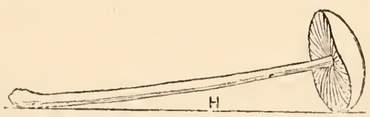

Fig. 123.

as they can easily be transferred to glass for examination by breathing on a corner of a glass slide and just touching it on to the dry spores; thousands will attach themselves to the glass, and, moreover, the supply from one fungus appears to be perfectly inexhaustible. To secure a good batch of spores, it is not sufficient to let the Agaric merely rest in the position shown at H (fig. 123), for the spores will not properly fall when this plan is adopted; a far better one is to cut a small hole, about the size of the diameter of the stem of the fungus, in the centre of the paper on which the spores are to be deposited: slip the stem through the hole, carefully draw up the paper collar, and support the fungus in a small pot, glass, or dry phial, and placed under a propagating-glass to keep the plant fresh, as shown in fig. 124. If it is wished to fix the spores, let the paper be first washed with a thin solution of gum-arabic, which must get perfectly dry: the spores can now fall upon the dry gummed paper, and after the deposition the gummed surface must be breathed upon to moisten the gum, and when it has dried for the second time the spores will be fixed, and not readily rubbed off.

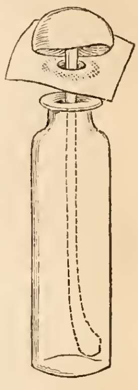

Fig. 124. Agaric placed to catch spores.

It is necessary to prepare the woody specimens in a different manner. They must first be perfectly dried before the fire, or in the sun, and then a thin slice must be sawn (or cut with a powerful knife) out of the middle. This slice may be poisoned, as described hereafter, and mounted on the herbarium sheets at once. If the Polyporus is very thin, it may be mounted in company with the slice, but more than one specimen is desirable, as it is indispensable to have both surfaces handy for examination. If the specimens are very large, they are best kept in wooden boxes, and labelled according to the genera and sub-genera they contain; or they may be kept in drawers, the drawers being divided by partitions if large, and labelled outside. If boxes are used, they should all be the same depth; the height and width may be doubled or halved, according to the nature of the plants: the plan will be better understood by reference to the diagram, fig. 125. If this plan is adopted, there will be no waste space, and the boxes will stand evenly upon a sideboard or against a wall.

Before the specimens are transferred to the herbarium they may or not be poisoned, according to the wish or convenience of the collector. Some of my plants that have never been poisoned remain perfectly uninjured, whilst others, which have been treated with a strong solution of corrosive sublimate, have been devoured by larvæ, &c., introduced, I presume, since the plants were put away. A solution of corrosive sublimate in pyroligneous naphtha, carefully washed over the specimens, has been recommended; but the ordinary poison is oil of turpentine, mixed with finely-powdered sublimate, well shaken before applied. If the specimens are to be glued down, they should be mounted as shown in figs. 121 and 122, and fixed with poisoned gum tragacanth, so as to display all their characters; but some botanists, and myself amongst the number, prefer to have the specimens *free*. For this purpose I have envelopes gummed to the herbarium sheets, and the specimens (including a small paper containing the spores) are free within the envelopes. If the spores are free upon smaller papers they cannot be poisoned. Some mites are very fond of the spores of certain species, whilst they will not touch the spores of others: therefore, if they are to be kept perfectly intact, gummed paper must be used, or they may be kept between little slips of

Fig. 125. Cabinet for Fungi.

mica. As to the labelling of the herbarium sheets, I shall not touch upon that, as the plan universally followed is similar to the one used for flowering plants. Some sub-genera of Agaricus, however (as Tricholoma), are so numerous in species that it will be found requisite to have several wrappers for one sub-genus.

Now as to the necessary notes to be made on the sheets: the points in discriminating fungi differ considerably from those used in naming flowering plants. It is presumed the spores have been preserved by the collector. Now, if he has time, the next best thing is to measure and note them at once, in decimals of an inch and millimetre; a second and essential thing is a note as to the taste of the fungus, whether it is mild, acrid, bitter, &c. This point will be found very useful, as some species are tasteless, insipid, or extremely acrid, bitter, or poisonous: it is only necessary to taste a small piece; but as so little is really known of the qualities of fungi, unless this is done no advance will be made. I invariably taste every fungus new to me, and have notes to this effect of all the species which have passed through my hands: in some species the effect is very peculiar, sometimes (as in *Agaricus melleus*) it causes a cold sensation at the back of the ears, and swelling of the throat; at others (as in *Marasmius caulicinalis*), the taste proves to be intensely bitter; some are so fiery (as in *Lactarius turpis*, *blennius*, and *acris*), that the smallest piece placed upon the tongue resembles the contact of a red-hot poker. Often, when I have been out botanizing with young men and amateurs, when a dubious *Russula* or *Lactarius* has been shown me to name, I have requested the inquirer to taste it, as, if mild or pungent, the taste might at times decide the species; I have generally found, however, that though certain persons are anxious enough to acquire *names*, they will not burn their tongues to secure them. No fungi that I am acquainted with are really pleasant raw, unless it is *Hydnum gelatinosum*, though many are very good when cooked. A very important thing to note is the odour in the larger fungi: many are very pleasant, like meal; a few are sweet; several resemble cucumber (as *Agaricus cucumis*), one mice (as *A. incanus*); another stinking fish; whilst *Marasmius fœtidus* and *impudicus* are like putrid carrion; others are like burnt flannel, garlic, rotten beans, and almost every imaginable disagreeable thing. The habitat is of great importance: if the plant grows upon trees, the tree should be named; or if parasitic upon any other material, the matrix should be named with the place. The viscidity, dryness, or bibulosity must be given, and in the *Agaricini*, any notes that may suggest themselves as to the presence or absence of a veil, volva, or trama, and whether the gills have a habit of separating from the stem, as at J (fig. 122), must be carefully noted.

The study of the larger fungi has been to me one of the greatest pleasures of my life: when all things else have failed, this has never failed; it has taken me into the pleasantest of places, and amongst the best of people. Had it not been for fungi, I should have been dead years ago; often tired, jaded, and harassed with business matters, a stroll in the rich autumn woods has given me a renewed lease of life. In these favourite haunts I never tire or flag; rain, fog, and mud never detract from the pleasures of the woods to me—I am only depressed in the hot, dry weather of midsummer. In the autumn I constantly visit the forests, with all my collecting paraphernalia; I sometimes take a saw to cut off the big, woody, fungous excrescences of trees. I was once fortunate enough to find a ladder in a wood, which proved invaluable for ascending the beeches in search of *Agaricus mucidus*, &c. I, however, find fungi everywhere: I only go round the corner, and there they are. I often visit a neighbouring builder's yard, and descend the saw-pits, to the amazement of the operatives: some of the rarest species of our Flora, and many new ones, I have found within a few minutes' walk of my own house. I once found a rare *Lentinus* on a log as it was being carted down King William Street, and a year or so ago an undescribed *Peziza* flourished inside my cistern.

Collecting fungi is not without its humours as well as its pleasures, as the following will show. I once saw a portly, well-dressed gentleman walking along the high road, with his vasculum over his shoulders, and carrying home (one in each hand) a pair of cast-off, rotten boots, discarded by some vagrant; the rotting leather having produced a crop of rare microscopic fungi. At times abominable cast-off fœtid gipsy rags will be lovingly taken from out a ditch, and choice pieces cut out and consigned to the vasculum of the cryptogamic botanist; at other times some rare species will be seen "up a tree," and it has several times happened in my presence that one enthusiastic botanist has got on to the shoulders of another to secure a prize, or even waded into a pond to get at some prostrate fungus-bearing log. The humours of truffle-hunting are manifold. I have seen a gentleman trespass, on hands and knees, through a holly hedge, on to a gentleman's lawn, and there dig up the turf in some promising spot, risking an attack from the house-dog, or a few shots from the proprietor; the said gentleman meanwhile armed with a rake, gouge, and dangerous-looking open knife. Country labourers are often sorely puzzled by the acts of cryptogamic botanists: they stand agape in utter amazement to witness poisonous "frog-stools" bagged by the score. Ofttimes one gets warned that the plants are "deadly pisin;" but collectors are usually looked upon as harmless lunatics, a climax generally being reached if a gentleman in search of *Ascoboli* and the dung-borne *Pezizæ*, sits down, and after making a promising collection of horse or cow-dung, carefully wraps these treasures in tissue-paper, and puts them in his "sandwich-box."

One word of warning to the beginner—never, on any account, amass and put away a lot of imperfect materials with insufficient notes, for in the end they will prove worse than useless. To name fungi with certainty the fullest notes and most complete materials are indispensable: without these nothing whatever can be done. It is far better to laboriously make out twenty species, and know them in all their aspects for certain, than to amass imperfect materials of two thousand without any sound botanical knowledge. If the former course is pursued, the study of fungi will prove a never-failing source of pleasure to the mind and of health to the body.

In conclusion, I cannot do better than quote a few words written by the illustrious Fries (now seventy-eight years of age) in the preface to a recent work of his on Fungi, he says: "Now, in the evening of my life, I rejoice to call to mind the abundant pleasures which my study of the more perfect fungi, sustained for more than half a century, has throughout this long time afforded me...... Therefore, to botanists, who can wander at will the country side, I commend the study of these plants as a perennial fountain of delight, and of admiration for that Supreme Wisdom which reigns over universal nature."

12, *North Grove West, Mildmay Park, N.*

THE IRISH NIGHTINGALE.

WHAT is that shy, sprightly little bird which swings so curiously from yonder giant bulrush, its coal-black crest perkily raised, its throat throbbing in passionate song? On he darts before us, springing from reed to reed, the white streaks on his inky tail flashing in light as he dives through the tufted sedge; a second lost to sight, up he starts again, again bursts forth in unwearied song; haunting our path, he wiles us from the nest where all his joys are centred. What a restless little fellow it is! Many a time have I watched him both by night and day; always on the move, he floods out his sweet inward melody. Little matters it to him whether the sun is in the zenith, or the pale chill moon alone casts a path of light across his sedgy home, he always sings—at least such is my experience of him,—and if by chance he should be silent, a stone thrown into the water will at once arouse him, and his note, answered by a hundred others, fills the night with music.

He is our only night-singer, "the Irish Nightingale," as he is called by fishermen along the Boyne. "Jenny-Blackcap" is another popular name for him; but what his real name is I am at a loss to find.

Is he the veritable Blackcap (*Atricapilla* of Ray) of whose song naturalists speak so highly? White, in his "Natural History of Selborne," in speaking of this bird, says, "he is superior to any song-bird we have, the Nightingale excepted." The wild sweetness of his note always brings to my mind those lines in a song in "As You Like It:"—

> "And tune his merry note
> Unto the wild bird's throat."

Another eminent naturalist of the present day describes him as the sweetest and richest of song-birds, while in trilling he excels every songster of the grove. Yet the Blackcap is never spoken of as being "a song-bird of night," which the *Passer arundinaceus minor*, or Lesser Reed-sparrow, is known to be.

The Blackcap builds his nest in tufts of grass; so does the bird I write of, though sometimes his nest is to be found slung from four or five reeds woven together.

The Blackcap frequents orchards and gardens, feeding on insects and fruit; "the Irish bird" is to be found there too, though more generally seen by the banks of rivers and low ground.

Book descriptions of the plumage of birds are so imperfect, that it is hard to judge anything from their source; but the Blackcap is always given a black crest, while the Reed-sparrow, or Hedge-warbler, is never given one, as far as I can ascertain, except by Bewick, who calls it the Black-headed Bunting. Now the Irish Nightingale has a decidedly black crest, which he can elevate and depress. Another remarkable feature is the ring of white round the throat, which gives a marked appearance to this bird, so as to make him easily distinguishable; the two outer feathers of the tail are also white, and show in high relief when the tail is extended in flight; the general tone of the body-feathers is greyish-brown, with a dash of green about the wing. He is a small, graceful bird, and sways himself about while singing, his throat throbbing as if it would burst; his note is a soft, sweet, guttural trill, which he continues unceasingly all night long. He is much valued as a cage-bird; but it is very hard to get one, it being impossible to keep an old bird in confinement, as they pine away when the season of migration comes round, and it is very difficult to find the nest, as the parent birds will never go near it while any one is in sight. A guinea can be obtained for a nest of healthy young ones, and boys are on the look-out for them all through the breeding season.

The Irish Nightingale is, like the Blackcap, a migratory bird, leaving us about the middle of September, and returning again in April.

LEPRAHAUN.

THE SQUIRREL AS A NEST-ROBBER.

I TAKE pleasure in corroborating Mr. Grantley F. Berkeley's statements concerning the habits of squirrels, as to their fondness for eggs. It is well known on this side of the Atlantic, that small birds are scarce just in proportion as the squirrels are numerous. During the present spring, I have been on the look-out for the nests of certain warblers, and twice instances of the Squirrel (*Sciurus migratorius*) devouring crows' eggs have come to my notice. In each case my attention was attracted by the squirrel overhead, dropping, instead of fragments of nut-shell, small bits of mottled green egg-shell, which could be readily recognized. I patiently waited until the egg was devoured, and then watched the future movements of the thief. After licking his paws a moment, and apparently surveying the neighbourhood, he slipped from one bough to another, with an occasional leap to an adjoining tree, until he reached a large elm overhanging the Crosswceksen Creek. Far up in the top of the tree he clambered, and presently a crow "gave tongue" in a manner that brought her good mate and comrades (*Quiscali*) *ad infinitum.* Fortunately, a break in the branches enabled me to see the *modus operandi* of the squirrel. He scrambled along the *under side* of the branches, successfully dodging the "dips" of the crows; and when within a foot or more of the nest, leaped in and out, but seizing an egg in his mouth as he did so, like a flash, and dodged the crows and smaller birds as he descended the tree, keeping, on the retreat, as on the advance, as much as possible on the under side of the branches. If Mr. George Cox, who wrote in SCIENCE-GOSSIP for 1871, p. 237, could have seen the adroitness displayed by our grey squirrel in robbing a crow's nest, he would not wonder why pheasants allowed the robbery of their eggs by the British squirrel. I have never seen your squirrel in his native haunts, but do affirm that *our* grey chap could "bamfoozle" even *your* pheasant, provided the nest of the bird was in a tree, and on branches that would give the nimble-footed fellow any chance at all to hold on. The destruction of birds' nests by squirrels became so prevalent in the public squares in Philadelphia, that "the authorities," preferring the birds, were compelled to rid the "city's lungs" of the innumerable squirrels that had been carefully protected for many years.

CHARLES C. ABBOTT.

Trenton, New Jersey, United States.

THE PRESERVATION OF LARVÆ.

IN the July number of SCIENCE-GOSSIP it was stated that the larvæ in public collections are preserved by professionals, who keep their mode of doing it secret. Seeing this, I am led to think that a few words on the preservation of larvæ would not be unacceptable to some of our entomological readers. It is not unnatural that professionals should be desirous of keeping their knowledge to themselves, and until recently few others knew how to preserve larvæ.

At the commencement of the present year I was favoured with some instruction upon the subject, and I may add that I am now able to preserve almost any of our larvæ, so that they look perfectly life-like.

The apparatus required for the purpose is very simple:—First, a blowpipe; and one suitable to the purpose is best made by melting the end of a piece of glass tubing with an ordinary blowpipe, drawing out the end when pliant, and breaking off the small piece at the point which is solid. Next let two pieces of watch-spring be procured, each about five or six inches in length. These being bent at right angles about ⅜th of an inch from the end, should be fastened to the glass blowpipe, as shown in fig. 126. A spirit-lamp, and for an oven a small tin box, or, better still, a wide-necked glass bottle with a stand to support it, will be all that is required. Fig. 127 shows these as they should be arranged for use. Having killed the larva by placing it in the cyanide bottle, proceed to divest it of its internal organs; and this should be done by forcing them through the anal orifice with the forefinger and thumb, between two pieces of stoutish blotting-paper. This done, fasten it to the blowpipe, as shown in fig. 126, the two pieces of spring which press against the point of the blowpipe holding the smallest portion possible of the creature's skin: then inflate the larva and hold it in the oven (fig. 127), which should be previously well heated. The larva should be kept blown out whilst drying, but not so much so as to give to the animal an unnatural appearance, to prevent which they are often steeped in a solution of alum for a short time prior to being operated upon. Two or three minutes at the outside will suffice to dry the larva, which may then be removed as finished; but should it be such a larva as that of the Privet Hawk-moth (*S. ligustri*), it will turn brown after being thus treated, and artificial colouring should be employed. I have seen one of these which had emerald-green puffed into it; and had it been placed beside a living specimen, it would have been difficult to distinguish the one from the other. Only green larvæ such as this will require much pains bestowed upon them, as the majority of the others will retain their natural appearance very well without being artificially coloured. Larvæ such as that of the Goat-moth (*C. ligniperda*) will be the least difficult to preserve; those of the Puss-moth (*C. vinula*) preserve well, and from their peculiar shape have a very quaint appearance. The larvæ of the Gold-tailed moth (*L. auriflua*) are perhaps the prettiest; but I strongly advise the inexperienced to use a pair of gloves in handling them, or he may turn rather red about the neck and eyes, as if stung by nettles, and, speaking from experience, I can assure him that the pain is quite as bad, if not worse.

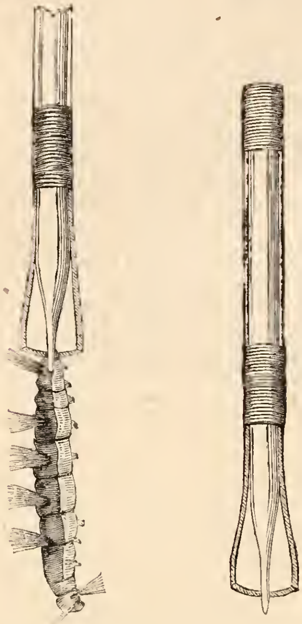

Fig. 126. Blowpipe attached to Larva.

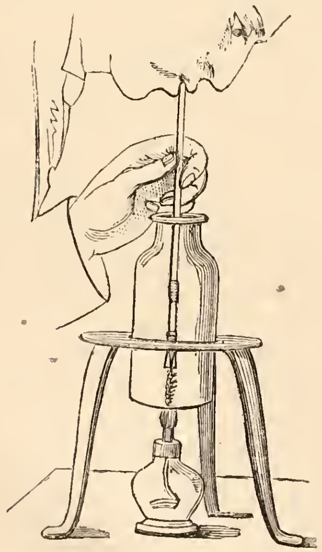

Fig. 127. Showing mode of Preserving.

With a little patience the entomologist will find himself able to preserve larvæ well, and thus be enabled to possess the larva, as well as the pupa and ovum, of each imago. H. A. AULD.

NEW BOOKS.*

ALTHOUGH so far distant from the "reading season," we cannot complain of the scarcity of new books and new editions, and those of a valuable character. The first on our list may seem scarcely in keeping with the scope and character of our magazine, but in it the student will find a mass of anecdotes, traditions, &c., all of which more or less bear on zoological and botanical folk-lore. The science of comparative mythology—that which traces the vague traditions and myths of all nations to a common source—is one of the most modern, and at the same time the most fascinating. To find the fairy and goblin tales of our childhood possessing a mythological significancy is indeed rather startling. Some of the most learned thinkers and scholars of our time are engaged in collecting the disjointed and scattered facts, and combining them into a clear and incontrovertible story.

* "Traditions, Superstitions, and Folk-Lore; their Eastern Origin and Mythical Significance." By Charles Hardwick. London: Simpkin, Marshall, & Co.

"The Scientific and Profitable Culture of Fruit Trees." From the French of M. Du Breuil. London: Lockwood & Co.

"The Insect World." By Louis Figuier. A New Edition. London: Cassell, Petter, & Galpin.

Among them we may name Max Müller, Cox, Baring-Gould, Tylor, Kelly, and others. Mr. Hardwick's book is a contribution to the same general subject, based chiefly on the folk-lore of Lancashire and the northern counties. It displays an intimate knowledge of the author's topic, and a loving acquaintance with English literature. Moreover, it is pleasantly and charmingly written, in most excellent English, and there pervades in every page an earnestness which shows what importance he attaches to it. We have read it through carefully and profitably, and cordially hope all its readers will enjoy the same pleasure as ourselves.

Du Breuil's work on the "Scientific Culture of Fruit Trees" is already well and favourably known, and every horticulturist will be glad to see it translated into English. It has also had the advantage, whilst being prepared for us in our native tongue, of being superintended by two able and practical gardeners. This second edition has been revised, and is prefaced by a short introduction by George Glenny. The illustrations are numerous, and such as will be of advantage to amateur gardeners, and the whole book is got up in a tasteful style.

The work of M. Figuier has been before the world some time, and the opinion of naturalists upon it is generally known. This edition is smaller and more portable than the former, and like it is embellished with a large number of ably-executed woodcuts. As it has come out under the revision and correction of Professor Duncan, it is shorn of a good many of the startling incidents and attempts at the marvellous which characterize Figuier's books. Embracing the general history of insects all over the world, many portions of their description are necessarily very meagre.

THE INSTINCTS OF ANTS.

EVEN a mere casual observer must sometimes be struck with the apparent fact that these little insects have the faculty of communicating with each other, and conveying special information concerning their own welfare or requirements, and also the sense of reasoning to a very surprising degree, which enables them to meet certain difficulties as they occur.

If some moistened sugar be placed near the nest of the small black garden ant, a solitary straggler will soon accidentally discover it; he imbibes his own load, and finds his way to the nest with information: speedily a number of others emerge, make straight for the sugar, and continue to pass to and fro in the most sedate and business-like manner till the whole of the provender is conveyed to the nest. Their behaviour is very different in the case of live prey. If a small caterpillar is placed in their way, one or two will at once attack it; but if they find they are not strong enough to master it, one will sometimes run away into the nest and give the alarm. Numbers of them then come rushing out to the rescue in great anger and excitement, which subsides the moment their prey is slaughtered of which the majority take no further heed, but leave only one or two to drag the carcass homewards. I once emptied out a sac of spider's eggs (taken from a neighbouring rose-bush) near to an ants' nest. These were speedily discovered, but were evidently a kind of provision that they had never been accustomed to, for many, in endeavouring to carry them away, grasped them so hard as to break the shell, and they had to stop to devour the contents then and there. This accident frequently happened at first, but they speedily learned to handle them carefully and carry them without breaking them; and many times afterwards I fed this colony with spider's eggs, which were removed without a single case of breakage, as they perfectly well remembered the nature of the provision that they had to deal with.

But the staple food of this species of ant is "honeydew," which is a secretion forcibly ejected from the two tubes on the backs of numerous species of aphides. The ants lick this off the surface of the leaves where it has been cast, but they mostly prefer obtaining it direct from the aphides themselves, which they cherish and protect with the most zealous care, evidently considering them as their flocks and herds. This is a well-known fact. But on one occasion I happened to observe, under the curled-up leaves at the top of the twig of a currant-bush, an immense number of aphides as usual under their charge, and guarded by a dozen or so of ants. Two common "ladybirds" were also there, devouring the aphides in spite of the efforts of the ants to prevent it, who displayed the greatest anger by springing on the backs of the robbers and trying to get hold of their legs on either side. At every attempt the ladybirds coolly tilted their impenetrable *elytra* from side to side, so as to leave no room beneath for the assault, and, with antennæ drawn in, continued their meal with perfect impunity. While watching this amusing scene, a prowling earwig made its way up the stalk (earwigs are great destroyers of aphides). It thrust half its body under the leaves, and after eating one or two was speedily discovered, but proved no match for the ants, who, attacking its legs and antennæ, soon compelled it to beat an inglorious retreat, hotly pursued by several of the ants. During the night there came a heavy shower of rain, and a day or so afterwards I stepped out of the path to see how the ants and their charge were progressing. Much to my surprise, I found that they had carried up particles of wet loam, and plastered and built up every external opening between the leaves in a most substantial manner, leaving only a small entrance beneath: in this manner keeping out all intruders, and inclosing the aphides entirely for their own benefit. The twig in question was near a yard high from the ground, and, as if the colony retained some recollection of their clever piece of work, exactly the same thing was done on this currant-bush the succeeding year.

It might perhaps be argued that there was no special design or intention in this, considering the building instincts of ants; but this year I observed an incident relating to them that surprised me still more:—In an inclosed orchard, at the root of a small plum-tree partly decayed in the trunk, there was a nest or colony of ants, which evidently mostly depended upon the tree for provisions, as there were abundance of aphides amongst the leaves. A string of ants constantly passed up and down, the ascending ones empty, and the descending ones so inflated that their bodies appeared transparent. A few sheep were then turned into the orchard to eat down the grass. These animals sadly disturbed the poor ants by making a rubbing-post of the tree, coating the bark with filaments of wool, which interfered with the passage of the ants, many of which were also probably destroyed, and but few had the courage to venture up. Some time after this I looked again, without seeing a single ant on the stem of the tree. Observing a fissure halfway down, I noticed a large quantity of fine particles of rotten wood, looking like snuff, had been thrown out, and at the bottom of the cavity I perceived a regiment of ants passing up and down. I then found that in the fork of the tree, where a small branch had been sawn off and got rotten at the core, that they had made a passage through, having thrown out more particles of touchwood. They had no visible exit at the bark of the tree, but made their way to the nest through some unseen channel in the root. During the recent rains the former entrance to the nest has become filled up, and they do not seem disposed to open it again: therefore, the only entrance to their home is some five feet up in the tree, which they now avail themselves of in perfect security and comfort, passing in and out in great numbers.

I state this as I have witnessed it, an existing fact, without having the boldness to assert, that finding the road outside the tree no longer safe or practicable, they should cause their engineers to make a survey, and who decided that the core of the tree was sufficiently soft and rotten to enable them to work a tunnel through, which, from the quantity of *débris* thrown out, must have cost a great amount of labour. If so, it is very marvellous that these little insects should be gifted with a degree of sagacity, almost amounting to a reasoning faculty, that many large quadrupeds do not possess.

F. H. WENHAM.

"MY GARDEN."*

A "TOUR round my Garden" has already appeared in French garb, but it was left to an Englishman to work out the idea perfectly. Shenstone the poet had first constructed a garden in which new scenes of beauty were always meeting the eye, and then had immortalized his attempts in classic verse. But Mr. Smee has shown the world what a treasure of picturesque beauty, of botanical, zoological, geological, and general knowledge, may be obtained in a plot of ground of less than eight acres. In turning over the voluminous work before us, with its one thousand two hundred and fifty woodcuts and plates, one is literally astonished at the faculty which can produce so much out of what appears so little. The estate in question is situate in the hamlet of Wallington, on the banks of the river Wandle, in Surrey. Its owner, and the author of the present work, first introduces us to a brief sketch of the parish in the Celtic, Roman, Anglo-Saxon, and mediæval periods; after which to a period far older than any of these, when "the Geology of my Garden" was commenced. The geological sketch is ably and experientially done; for when Mr. Smee first entered upon the land of his garden, he could not walk across it, on account of its being so boggy. Since then drainage and section-cutting has gone on, and as good a knowledge of geology obtained as pulling about a plot of eight acres could bestow. Situated on the edge of the London basin, all the lower tertiary beds come up in the neighbourhood, although the fossils are chiefly from the chalk. Many of these are

Fig. 128. *Pseudo-diadema variolare.*

Fig. 129. *Polypothecia* (Cup-shaped Sponge).

Fig. 130. *Spondylus spinosus.*

figured, and amongst them are the above illustrations of the characteristic and commoner fossils. The author states that his son has extensively examined the law of the deposit of silex on decomposing animal matter; and, as Mr. A. H. Smee (the gentleman alluded to) has a fair reputation as

* "My Garden: its Plan and Culture: together with a general Description of its Geology, Botany, and Natural History." By Alfred Smee, F.R.S. London: Bell & Daldy.

a chemist, his conclusions on this point are worth attention. "Some organic bodies," he says, "appear to silicify with ease, others with difficulty. A sponge throws down silex readily. He has been able to silicify a *blood-corpuscle* so perfectly that when incinerated and its animal matter destroyed, it showed its structure. Bones do not appear to throw down silex readily."

The reader will linger with pleasure over the chapter devoted to the "General Plan of my Garden," as he feels that here the greatest labour of the author was bestowed. There he learns of ferneries, alpineries, &c., and is assisted in his comprehension by most charmingly-executed plates of spots that might serve for copies to "Fairies' Dells," or "Wood-Nymphs' Grottos," in the Christmas pantomimes. Mr. Smee's object was (after so laying out his garden as to obtain the greatest amount of picturesque effect) to have such plants, native and foreign, as would be in bloom the whole year round. The greater number of woodcuts is devoted to the illustration of the favourites; and, coming from the pencil of Mr. Worthington Smith, they are gems of wood-cutting art, as the following examples will show.

Fig. 131. Variegated Pink.

Fig. 132. *Coreopsis tinctoria.*

We cordially agree with the author in denouncing the common practice of gardeners confining all their floral efforts to crowding one particular summer month with flowers, to their exclusion the rest of the year. "At the present time all gardens look alike; the inevitable scarlet geranium flourishes to the exclusion of hundreds of little gems which should have their place in the garden of every lover of natural objects." Our sympathies are with him also when he condemns the common fashion of making rose-trees look "like a mop, with

Fig. 133. *Dianthus chinensis.*

Fig. 134. *Mimulus.*

the handle stuck in the ground!" This is termed a "standard," and is about as ugly a form as art can twist nature into. Instead of this, Mr. Smee trains his rose-trees into a pyramidal form, four to six feet high, one far more elegant, and which, when adorned by the "Queen of flowers," is a most charming object. He states: "I think that no one who saw my pyramids would ever think of growing standards again."

We have frequently come across excellent botanists whose horticultural knowledge was ridiculously small. Nay, there are few good English botanists who appear to care about "garden plants." Many of these, however, are of a most curious nature, and well illustrate the flora of other lands and the physical circumstances, extending over long periods of time, which have caused organic forms to be so modified as to assume their often outlandish nature.

Fig. 135. *Darlingtonia Californica.*

Fig. 135 is one of these, one of the fly-catching plants, having hairs in the middle of the tube, so arranged that when the flies get in they cannot escape.

Cephalotus is a bog-plant, like Venus's fly-trap, which has grown well out of doors in "My Garden." Of course, in a work like the present, most of the leading varieties of roses are figured, as indeed are

Fig. 136. *Cephalotus follicularis.*

also those of garden fruit. One might object that occasionally the illustrations have run riot, as when the author gives, what "Mrs. Lirriper" would have called, the "portraits" of his garden-roller, watering-cans, &c.! His cuts of the most important of the curious orchids are very interesting, and among them there occur *Brassia*, and a group of several others. *Anæctochilus argenteus* has perhaps the most beautiful leaf of any known plant. Mr.

Fig. 137. *Brassia maculata.*

Smee tells us that all the above are difficult to cultivate, although two species grow with him in the greatest luxuriance.

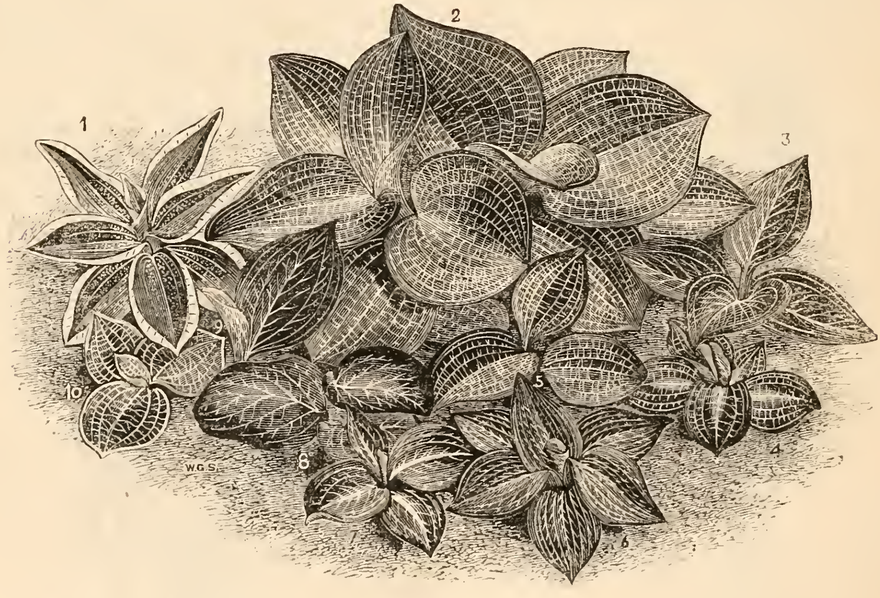

Fig. 138. 1. *Anæctochilus argenteus*, Brazil; 2. *A. Lowii*, Borneo; 3. *A. ordiana*; 4. *A. petola*, Java; 5. *A. xanthophylla*, Ceylon; 6. *A. argenteus pictus*, Brazil; 7. *A. setaceus intermedius*, Ceylon; 8. *A. Veitchii*, Java; 9. *A. Dawsonianus*, East Indies; 10. *A. setaceus*, Ceylon.

Nor is the English "Flower-garden" less represented by some of our most beautiful native flowering plants. Many of these occur in what the author has called, with some indifference to etymological combination, his "Alpinery." This is constructed on a small mound near the "Fern-glen," and in the fibrous loam and stones alpine plants seem to flourish. It is so arranged that "there is scarcely any time of the year when some lovely object may not be found" in blossom. Another like unto it is termed the "Saxifrage Garden," and still another, called the "Sempervivum Garden." In the former grow most European saxifrages, than which few flowers are more chastely beautiful. The Sedums, in their variety of leaf and flower, are scarcely less attractive. In the pretty streams which water this delightful estate grow the Flowering Rush (*Butomus umbellatus*), and the Water-soldier (*Stratiotes* *aloïdes*). Nor are the cryptogamous plants wanting, as the references to the "Fern-glen" will have shown. The author's description of it urges one to commence forming one of our own immediately, and

Fig. 139. Flowering Rush.

Fig. 140. Water-soldier.

the full-page illustration only serves to strengthen the intention. We can readily understand that this Fern-glade "is a spot of great beauty, and my visitors linger over it with delight in the summer afternoon." Here grow ferns from every country, whose diversified fronds and tints make the place a little paradise. Our English ferns grow in profusion, none prettier, although more striking. Fungi

Fig. 141. Ceterach.

Fig. 142. Moon-wort.

are also represented and illustrated, as are the fresh-water algæ, lichens, mosses, microscopic fungi, &c. Weeds and wild plants, ornamental grasses—each has its section and appropriate representation. Perhaps among our edible fungi none can be grown with such certainty, or are of such use in the kitchen for flavouring purposes, as the Morell (*Morchella esculenta*), and yet we usually trust to the chapter of accidents to be supplied with them. The chapter on "My Forest Trees" is very entertaining, as the author has collected an assortment from all climes, including the Hardy Palm (*Chamærops excelsa*), the only one that will live out of doors in this country. The illustrations of these trees and of the "Shrubs" are among the best in the book.

Natural History in almost every department has been lugged in to do duty in "My Garden." Thus, we have English butterflies and moths, with their larvæ, and the plants on which they feed; beetles, hymenoptera, neuroptera, diptera, &c., and a host of entomological details. Conchology is represented

Fig. 143. *Morchella crassipes.*

by the land and fresh-water snails and slugs, and ichthyology by the species which frequent our English waters. After a brief discourse on the "Reptiles" and "Garden Animals" found on the estate, we come to the "Birds," including aquatic

Fig. 144. Hawfinch.

and terrestrial kinds, frugivorous, insectivorous, and rapacious. One cannot wonder that a charming spot like "My Garden" should be a retreat for our feathered songsters, especially when they receive succour and protection so freely. Accordingly, we find a tolerable list of birds, such, perhaps, as could only be collected together under these auspices

"A garden without birds, is like a mansion without inhabitants!"

Fig. 145. Black-cap.

Fig. 146. Stone-chat.

Fig. 147. Chiff-chaff.

Lastly, the book concludes with a chapter devoted to the "Gardens of various nations," and a general calendar for 1871. But the inexorable limits of space remind us that we have already lingered over a book which cannot fail to charm the naturalist and the horticulturist alike, and which has so pleasing, and yet so attractively, described how, with the smallest materials, it is possible to achieve the greatest results.

"ANOTHER PHARAOH."

I HAVE long been wishing to send an account of my king of pets to SCIENCE-GOSSIP, and I have now been so effectually stirred up by "M. A. D.'s" charming history of his ancient Majesty "King Pharaoh," that I will ask you to insert a short chat concerning one of the same solemn dynasty, even at the risk of seeming to have occasionally copied from the prior history.

Unlike "Pharaoh," my young owl, fresh from a nest on the pleasant banks of the Wye, was rescued out of pure charity, at the price of twopence halfpenny, from some ruthless urchins who had killed its baby-mate (they are generally hatched in couples), and were proceeding to dispatch him also, on the plea that "owls are unlucky"; and charity proved its own reward, by the fund of amusement the bird has ever since afforded us.

He looked so grotesquely sad, so hideously ill-proportioned, that we could never look at him for the first week without *éclatant de rire*, and he was at once given Mr. Wood's admirable designation, "οὖλος ὄνειρος." Unlike "Pharaoh," he never caught a cold in his head, but, curiously like him, he at first shared my bedroom, until his erratic habits at night—padding all about the room as if possessed of heavy human feet—caused him to be banished to the cellar, where he soon chose a dark shelf and "moped supreme"; like Pharaoh, too, manifesting a great love of climbing stairs, frightening cookey not a little when she met this imp of darkness coming up from the lower regions into her own domains. And he *was* hideous!—a shapeless mass of fluff of pepper-and-salt hue, with those great mournful eyes, like a child's bad drawing, or some *lusus naturæ*, that only exists in illustrated books of fairy-tales. But he changed and changed as his feathers grew out, and we watched, as the tadpole did when his tail fell off, and said "What next?" Never till now did I understand the compliment a gentleman paid me when I was a little child; he exclaimed, "You are like the young owls, growing prettier every day." A somewhat doubtful one I feel it now!

Owlos had to be fed by cramming at first, and he liked it so much that in his solemn laziness he would never have fed himself at all, had he not been served with a little wholesome neglect in the matter of waiting on him at meals. He is fond of snails for pudding, after his raw meat dinner; but he will never touch them in winter or early spring, until they have become juicy by fresh green feeding.

Like "Pharaoh," he looks very picturesque with a mouse in his beautiful, hawk-like, fawn-coloured claw; but he looks his best when, leisurely holding a long writhing earth-worm, he reminds me of the old picture of Jove's eagle clutching the thunderbolts.

He soon became very tame; his favourite perch was on the top of the drawing-room door, or on the middle frame of the window-sash, from which he would watch the passers-by in the street for *hours*, turning his head after them till they were out of sight, and making the most ludicrous succession of bows to them, sometimes describing a circle with his head, raising himself up and down to make it as large as possible. A cracking with his beak was the sign of his grave displeasure, and this was invariably bestowed on a peculiarly large chignon, or when any outrageous display of colours in coiffure passed under the window and offended his owlship's stern taste. When tired of moralizing on street processions he would fly back to the drawing-room table, and laying his shock head on the soft cloth, he would watch my work with his great earnest eyes till they gradually closed in sleep; or would gently nibble my hair all over, drawing each bit through his bill so delicately! closing his eyes all the while in mesmeric bliss.

Now he is promoted to a large wire-built place under the trees in the garden, next to the bantam-pen. He eyed his fellow-pets at first with great interest, but soon made up his mind that they were too big to eat, and lived in most harmonious terms with them, until one day, when, seeing them enjoy a dish of earth-worms which he claimed for his own dessert, he suddenly pounced down among them with his sharp claws on their backs, and, as the Yorkshire people say, "squandered them" in all directions. Alas! one foul sin stains Owlos's soul, though I fear it does not lie heavy on his conscience! One morning we found him, shortly after a hatch of sweet little white French bantams had taken place, with a snowy chick in his cruel paw. We hung it, for an albatross, around his neck; but Owlos refused all signs of contrition—so he was wired off from his feathered cousins for ever.

Very early in life he, like "Pharaoh," tried to get into his jam-pot; so a huge bath was provided him, and now his delight is on warm mornings to splash himself all over (he is very modest in the act, and shuns all curious watchers), coming out a laughable caricature of a drowned rat — shrunk, bedraggled, and unrecognizable, like Barham's jackdaw under a curse,—a mere section of his former plump handsome self. Some prying village children one day witnessed the ceremony, and exclaimed "Look, look; her's a washing hisself!" when his disgust at the murdered Queen's English was unmistakable, for he cracked at them, and retreated precipitately.

Another owl comes from the woods, and sits on a thickly-ivied tree near him. The stranger gives a soft, rippling "Who-o-o-o," and Owlos answers with a scream; so we call the pair "Bubble and Squeak." He calls to me as soon as my step is heard in the garden, and whenever he has broken a saucer or knocked his tin dinner-plate over his table, he has always told me a long tale all about it, in such a concerned tone of voice! Would that he could speak! if only in the ancient Welsh tongue of his native county, which musically calls him "Dyllhuan."

He is beautifully coloured and marked; his head and back are of a rich oak-brown, curiously mottled; what ladies would call his under petticoats are of a delicate fawn; his breast cream-colour, and this, together with his wings, is flecked with white in downward lines, in such distinct patches as to have the appearance of white body-colour paint. A beautiful crimson line surrounds his orb-like black eyes, and the variety of feathers about his face is quite indescribable, his very eyelids being covered with them, and all of that peculiar downy texture, each single lamina standing loosely out from the shaft, which enables the owl to fly so noiselessly at night—coming down on its prey like a veritable flake of snow.

I will sum up my Owlos's biography by saying that he has just celebrated his second birthday by a supper of beefsteak *au naturel*, with snail fixings. The butcher always insists on spelling his name with an H in the weekly bill of provisions, a delicate allusion, I conceive, to the days of Ethelbert and Offa, when my pet's forefathers mingled their nightly cries with the *howls* of the wolves, in this ancient Welsh province of Menevia. W. E.

MICROSCOPY.

Quekett Microscopical Club.—The Seventh Annual Meeting was held at University College, July 26th, 1872, Dr. Lionel S. Beale, F.R.S., &c., President, in the chair. The report of the committee, read by the Secretary, congratulated the members upon the continued success and satisfactory condition of the club, detailed its progress during the past year, showed the number of donations made to the library and cabinet, also the number of members on the list; and referred to the publication of the catalogues of the slides and books, the Quarterly Journal, the Field Excursions, the Annual Soirée, and the special services rendered by certain gentlemen named. The Treasurer's report showed a satisfactory balance-sheet, from which it appeared that the income from all sources had been £272. 5s. 1d., and that there was a balance in hand of £12. 7s. 2d. Unanimous votes of thanks were passed to the Council of University College for the highly valued privilege of meeting in the library of that building free of charge; to the President for his valuable services during his two years' term of office; and to the Committee for their efficient conduct of affairs. The President then read the Annual Address, which was listened to with marked attention, and enthusiastically applauded by the meeting. The proceedings terminated with the election of officers, and the installation of Dr. R. Braithwaite, F.L.S., F.R.M.S., as President of the Club for the ensuing year.—*R. T. L.*

On Cleaning and Mounting Foraminifera.—When the specimens of foraminifera are small, it is best to treat them as follows:—Dry the mass, then place it under the microscope, and pick out the foraminifera with a split bristle placed in a holder, or a very fine camel-hair brush. Sometimes the brushes are required so fine that all the bristles, except one or two, may be cut away. After the objects wanted have been picked out, they may be placed in a test-tube (see Science-Gossip for August, 1872), and boiled in diluted potash. If the foraminifera require to be mounted dry, Mr. Davies says no better way can be adopted than dry cells and gum. (For full directions see "The Preparation and Mounting of Microscopic Objects," by T. Davies. Published by R. Hardwicke, 192, Piccadilly: price 2s. 6d.) In mounting the foraminifera in balsam, great care is required to completely expel the air from the specimens. This may be done by boiling in a test-tube, with Canada balsam or turpentine, or by the use of the air-pump. After the air has been thoroughly expelled, the specimens must be mounted in pure balsam. It is almost needless for me to say that the specimens must be *quite* dry before any attempt is made to expel the air or to mount. If this is not attended to, the objects, if mounted in balsam, will be quite useless; while, if they are mounted dry, moisture will condense upon the inner surface of the glass cover, and this will prevent a good view of the object. To examine the structure it is necessary to cut sections. This is fully explained in the book before mentioned. When more than one specimen of a species is met with, they should be placed on the slide in different positions. T. Rymer Jones says: "They should be attached to the point of a fine needle, so that they may be turned in any direction, and examined by reflected light condensed upon them by means of a lens or side-reflector."—*Wm. Sargant, jun.*

The Markings on the Test Podura Scale.—The July number of the *Lens* contains a paper by Dr. J. U. S. Arnold on the Podura markings. The following is a brief summary of his views on their character:—"There are, I believe, some species of podura that are scaleless, and are clothed with hairs — compound hairs; that is, the hairs are covered by projections, usually in considerable number at *one* end, where they form a brush-like arrangement. It is, then, my purpose to try and establish some points of similarity of structure between the hairs and scales themselves. If we agree that these compound hairs are covered by epithelial scales, as are the hairs of other animals, why should not the scales also be covered with like structures? There is no doubt that the epithelial scales on the hairs of *L. curvicollis* and *Degeeria domestica* bear a great similarity to the markings on the scales themselves. They are of the same shape, and I have in several instances made measurements which show the coincidence in size between the 'spines' on the hairs and those on the scales. . . . . . If the spines separated from the hair are examined by unilateral (oblique) light, a beading may be seen on them, as well as on the spines from the scales. Having satisfied myself as to that fact, the next thing was to separate the spines from the scales. On a slide of *D. domestica*, mounted, I believe, by J. Beck, of London, I perceived, to my great satisfaction, a fractured scale which showed the spines projecting beyond the broken edge, some of them bent and distorted." In order to be perfectly sure of the identity of the hair and scale spines, the writer adopted the following methods for obtaining the scale spines separate from the scale:—"I selected specimens of the scales that were not mixed with hairs and that show no free spines, and placed them in such a manner that the discharge from a Leyden jar could be brought to bear upon them, which not only tore to pieces the scales, but scattered the spines far and wide. I also, by means of crushing in an agate mortar, and even by crushing on the slide by pushing about the covering glass with the handle of a dissecting-needle, have fractured the scale in such a manner that the spines lay free, and side by side with the broken scale. What more is wanting to show that hairs and scales are of a similar structure? the hair consisting of a shaft, upon the surface or exterior of which are attached spine-like epithelial cells; the scale of a flattened shaft, so to speak, covered by analogous structures." The paper is accompanied by an "Albertype" of the fractured scale and detached hairs. The original photograph was taken with a Wales $\frac{1}{20}$ immersion. (I have observed a similar effect on a slide of *D. domestica.*) The scale is, however, not broken, but partially doubled over in a diagonal direction. Beck's new immersion ($\frac{1}{10}$) shows the so-called beading on the spines very distinctly. The beading forcibly reminds one of the medullary substance, or pith, seen in various hairs, such as the squirrel, mouse, &c. May not this beading or varicosity be caused by an internal pith?—*F. Kitton.*

ZOOLOGY.

Ravages of Anobium.—Under this head Mr. E. C. Rye has a paragraph in the *Entomologist's Magazine* for August. He describes that *Anobium striatum* completely riddles the paper of a publisher, five quires deep, outer wrapper and all. He thinks that a good soaking with boiling water and carbolic acid may suppress its ravages. He states that he has known *A. tessellatum* actually to bore through leaden roofing.

Coluber Austriacus.—I am pleased, but not surprised, at hearing that *Coluber Austriacus*, alias *Coronella lævis*, has been found in Dorsetshire. I wish your correspondent would be kind enough to say where it was seen. I presume on the Poole and Bournemouth heaths, where I have long expected it would be seen, in company with the beautiful lizard *Lacerta hispium.* This latter has not crossed the chalk downs into the North Hants, or Bagshot moors, as the Coronella has done, probably at a period when the plastic clays (and Bagshot sands over them?) had not been all but denuded of the chalk between Winchester and

Eversley—a very long time ago. But *Coronella lævis* has crossed the chalk hills. The first specimen found round here is due to a Sandhurst cadet; and I have had three or four more out of my parish. I believe that the snake must have been not uncommon in old times, but that it has been killed by turf-cutters, who mistook it for the little red variety of the adder. I did so once myself. It is, let your correspondent bear in mind, perfectly harmless. It should be looked for now to the south-east of me; in the moors of Aldershot, the Hurd Head, Blackdown, Leith Hill, and all the greensand moors of Surrey. It may have spread thither from the south and south-west before the parting of England and France. Meanwhile, I want instances of its occurrence in the New Forest, which—or the Bournemouth heaths—ought to have been its first remaining station in England.—*Charles Kingsley.*

New Additions to Zoology.—In the *Annal and Magazine of Natural History* for August, Dr. C. Lütken describes a new species of black coral (*Antipathes arctica*) from the Polar seas. This family had hitherto only been known from warm seas. It belongs to deep water, and Dr. Lütken conjectures that it may extend to all the deeper valleys of the ocean. The "Black Corals" are among the less known animal forms, and belong to the horny corals (*Gorgonidæ*). In the same magazine, Mr. H. J. Carter, F.R.S., describes a new species of Aplysina, from the north-west coast of Spain, under the name of *Aplysina corneostellata*. This is a genus of horny sponges, devoid of foreign objects in the core of the horny fibre. The same well-known naturalist further gives a description of two new sponges from the Philippine Islands, now in the British Museum, named respectively *Meyerina claviformis* and *Crateromorpha Meyeri*. Both were discovered by Dr. Meyer. The total length of the former is eighteen inches. Mr. Carter's summary remarks concerning it are as follows:—"This is the most exquisite sponge that I have yet examined as a whole, and in its parts. Individually, its spicules equal any in beauty of form, and collectively surpass all." The August number of the journal in question is rich in the record of new forms. Mr. John Gould, F.R.S., describes two new species of birds from Manilla, under the names of *Dicæum retrocinctum* and *Collurincincla parvissima*. There is also an account of a new genus and species of hydroid zoophyte, named *Staurocoryne Wortleyi;* whilst Dr. J. E. Gray announces a new genus of unicellular green algæ, from Port Natal, which he has named *Codiophyllum*.

Venus's Flower-basket.—Dr. A. B. Meyer has brought home, and placed in the British Museum, two specimens of this sponge in spirits, from the Philippines, which are entirely covered with a thick coat of sarcode like the bark on a Gorgonia, but softer, so that the siliceous fibres are entirely hidden from view. No one would suspect that this sponge had such a beautiful lace-like structure, but simply a netted or pierced tube, with irregular, circular, thick hoops. The sarcode is of a brown colour, most likely caused by the action of the spirit.

Popular Natural History.—The address of the Rev. H. H. Huggins, President of the Liverpool Naturalists' Field Club, just published, is chiefly devoted to the above subject. It is a capital argument in favour of the elevating nature of zoological and botanical pursuits, and contends that the truthful study of nature is homage paid to its Creator.

The Wyandotte Cave and its Fauna.—Professor Cope has contributed an elaborate article to the *American Naturalist* for July on the above interesting subject. He states that the Blind Fish (*Amblyopsis spelæus*) is the same in the Wyandotte Cave, which traverses the carboniferous limestones in Crawford county in South-western Indiana, as in the Kentucky Mammoth cavern. Blind crawfish abound, but they are specifically distinct from those of the Mammoth cave, though nearly related to them. An isopod, specifically related to a similar one in the latter place, was also found blind. Four species of beetles were obtained, all new to science, and two of them belonging to the blind carnivorous genus *Anophthalmus*. One of the others has rather small eyes. Centipedes were more abundant than in the Mammoth cave, the species being also distinct, and identical with that found in the caverns of Virginia and Tennessee. It is eyeless, as is also *Acanthocheir*, a peculiar kind of spider. Professor Cope is in favour of the view which ascribes the origin of these blind creatures to the modification of outdoor species having eyes.

Plant Lice.—The plant lice affecting the vines to such a severe extent in France is still attracting much attention. The French Academy has offered a prize of twenty thousand francs to encourage studies that will find a remedy to protect the vine against the disease without destroying it. The best remedy against the *Phylloxera*, as it is called, is the use of phenic acid, a substance nearly allied to and resembling carbolic acid.

New Chinese Animals.—The Abbé David, who has recently made some very interesting discoveries in China, has added to them a new species of *Ibis* (*I. sinensis*), a new Falcon (*F. tacroides*), a new *Elanus* (*E. sinensis*), and a new Salamander of the genus *Cynops* (*C. orientalis*). He also mentions the discovery of a great fresh-water Tortoise, attaining a weight of two and three hundred pounds, supposed to be *Chiria indica*.

BOTANY.

Preservation of Fungi.—The following method for the preservation of fungi, as given in the Rev. H. P. Dunster's work on botany, will, I think, be found in every way satisfactory, and, if not too long for insertion in your journal, might prove useful to some of your correspondents. Of course all the smaller kinds of fungi are easily disposed of, as all they need is simply being allowed to dry on the leaves, pieces of old wood, or other matrices on which they may have been found growing. With regard to the larger, and consequently more troublesome specimens, the following is the *modus operandi:*—"With a delicate scimitar-shaped knife or scalpel, such as is found in a surgeon's instrument-case, I make a double vertical section through the middle, from the top of the pileus to the base of the stem, so as to remove a slice. This, it will be at once seen, shows the natural outline of the whole fungus; the internal nature of its stem, whether hollow, or spongy, or solid; the thickness of the pileus, and the peculiarities of the gills, whether equal or unequal in length, decurrent upon the stem, or otherwise. There will then remain the two sides, or nearly halves of the fungus, which each in itself gives a correct idea of the whole circumference of the plant. But, before we proceed to dry them, it is necessary to separate the stem from the pileus, and from the latter to scrape out the fleshy lamellæ or gills, if an Agaric, or the tubes if a Boletus. We have thus the fungus divided into two portions—a central thin slice, two nearly halves of the stem, and the same sections of the pileus. These, after being a little exposed to the air, that they may part with some of their moisture, but not so long that they may shrivel, are placed between dry blotting-paper, and subjected to pressure as other plants, the paper being changed daily till the specimens are perfectly dry. When this is the case, the central portion of slice and the two halves of the stem are to be fastened upon white paper, together with the respective halves of the pileus upon the top of the latter in their original position. There will thus be three sections, from which a correct idea of the whole plant may be obtained. The *volva* and *ring* of such species as possess them must be retained. Some of the smaller and less fleshy kinds will not require to have the gills removed. In collecting fleshy fungi, care must be taken that they are not too old, and absolutely in a state of decomposition, or too much infested with the larvæ of insects. When this is the case, some oil of turpentine poured over them will either drive them rapidly from their holes, or destroy them. Species with a clammy viscid pileus, it is better to expose to a dry air, or the heat of a fire, before being placed in papers. The separate parts of the genera Phallus and Clathrus, I fill with cotton; keep them for a time exposed to a dry atmosphere, and then, after removing the cotton, subject them to pressure." I may add that, as a preservative against insects, the specimens (when dry) should be washed over with a solution of corrosive sublimate in pyroligneous naphtha, very carefully, so as not to discolour them. They also want to be looked to now and then, in case damp should get at them.—*J. S. W. Durham.*

The Cryptogamia of the Scilly Islands.—Having recently spent a few days at the Scilly Islands, I thought a few remarks on the Cryptogamic plants found there might not be uninteresting to the readers of Science-Gossip. I was surprised at the small number of mosses to be found—twenty-five species would outnumber all I observed on the islands. Of these, I gathered *Pottia asperula, Campylopus polytrichodeus, Trichostomum littorale,* and *Bryum alpinum,* all barren, as were most of the common ones; the Sphagni, or *Hypnum fluitans* division, not represented at all: the bogs seem to contain too much saltness for them. The Hepaticæ are represented by a very few species. I nowhere observed a single frondose form. On the rocks I observed *Frullania dilatata* and *F. fragilifolia,* the latter with calyces and male state, although I saw a single patch only. *F. tamarisci* grow on the stunted heath in a very small form. These, with *Jungermannia ventricosa* and a single species of Scapania, were all I saw there. The stone Lichens appear much the same as on the coast of Cornwall. I saw *Lecidia Muddii* and *Lecanora aipospila,* but neither of them so fine as on the Penzance coast. *Ramalina scopulorum, Roccella tinctoria,* and *R. fuciformis* occur on the rocks, but very sparingly and poor specimens, except the first, which is fine and in great variety of form. The frondose stone Lichens are pretty well represented. I gathered *Parmelia perlata* in fruit, and several others of the same genus. The Sticta family seem to be best represented. I gathered *Stictina limbata, S. fuliginosa* and *S. scorbiculata, Sticta pulmonacea* and *S. aurata,* the latter in great beauty; also, *Ricasolia latevirens.* This was in fruit, and the only one in that state. The *Asplenium marinum* is very common on all the islands; with most of the commoner ones on St. Mary's, the *Osmunda regalis* grows very fine in the boggy ground. Fresco Abbey and grounds are well worth a visit to the islands. The immense number of succulents on the extensive rock-work, as well as the fine collection of agave, aloes, New Zealand and Australian plants, are well worth attention. There seems to be no winter there by their appearance.—*W. Curnow, Penzance.*

Mineral Matter of Plants.—A large class of plants appears to grow vigorously on bare rock, and M. Baudrimont has obtained a number of such plants in a fresh state, and determined the amount of water and mineral matter they contained. In all cases the ash bore a considerable proportion to the organic matter, though often forming but a small fraction of the entire plant. The largest amount of organic matter was found in Aloes, and the smallest in *Cactus Peruvianus.* The ash in the latter was also smallest, and the percentage of water greatest.

Bacteria.—Prof. Cohn states that he finds, in opposition to the statements of Wyman and Crace Calvert, that the development of *Bacteria* in prepared solutions is entirely prevented by exposing them to a temperature of seventy-five to eighty degrees, whilst a temperature of seventy degrees is insufficient. *Pencillium* spores, on the contrary, are not destroyed at the above temperature.

Formation of Ozone by Flowers.—It has been found that many essential oils, like those of peppermint, turpentine, oil of cloves, lavender, bergamot, aniseed, nutmeg, thyme, and others, when in contact with the oxygen of the atmosphere in presence of sunlight, develop very large quantities of ozone. The oxidation of these oils is, in fact, a very convenient source of ozone, as they, even in small quantities, ozonize much oxygen. The action is strongest in direct sunlight, far less so in suffused daylight, and very weak or at an end in the dark. The development of ozone which has been begun in the light continues for a long time in darkness. Eau de Cologne, hydromel, and other aromatic tinctures, act in the same manner when exposed to the sun's rays. Experiments made on flowers with powerful perfumes, such as the narcissus, hyacinth, heliotrope, mignonette, and others, in closed vessels, prove that they also form ozone. Those with fainter perfume produce less ozone, those without scent none at all. Mantegazza, who has conducted these experiments, is of opinion that this important source of ozone is of great hygienic value for the purification of the air in marshy districts.

GEOLOGY.

The Food of Plesiosaurus.—Professor Cope recently exhibited vertebræ of a Plesiosaurus, and those of a smaller species, found in close proximity, the vertebræ column of the latter being immediately below that of the Plesiosaurus, and in a reversed position, as though it had been swallowed by the larger reptile, which was over thirty feet in length. The latter is a new species, and has been named *Plesiosaurus gulo.*

New Tertiary Mammal.—At a recent meeting of the American Philosophical Society, Professor Cope stated that the largest mammal of the American Eocene formations adjoining those of Wyoming was the *Bathmodon radians*, of about the size of a rhinoceros. It was an odd-toed ungulate, with peculiar dental character, which indicated a connection between different types of hoofed animals. He also stated that the mammalian fauna of Wyoming and Utah more nearly resembled that of the Paris basin than any yet discovered in America, and that it contained a still greater number of generalized mammalian forms.

Professor Agassiz's South American Expedition.—The evidences of glacial action, on a scale so extensive as to more than suggest that the southern hemisphere has undergone a similar general glaciation to that of the northern, are being abundantly brought to light by Professor Agassiz and his coadjutors. The former states that glaciers alone could have sculptured the physical geography of the country into its present shape. Moreover the general striation of the country is from the south northwards. This glaciation has been traced as far as the northern end of Chiloe island. The professor believes that it occurred simultaneously with the same phenomenon in the northern hemisphere, and that, during the glacial period, the two hemispheres were capped with a sheet of ice of enormous thickness. In South America he has now succeeded in tracing glaciation up to thirty-seven degrees south latitude, on the Atlantic as well as on the Pacific coast. The existing southern ice-fields, especially those of Magellan, have, like those of Switzerland, once had a much greater extension. Ancient moraines abound in the South American valleys, and in the Straits above-named. One was found damming up a valley so as to form a lake. Agassiz concludes by stating that, old hunter as he is in this respect, his anticipations of finding drift phenomena in South America have been realized on a greater scale than he had dared to hope.

Cave Deposits in France.—Milne-Edwards has just made a communication to the Academy on the Carnivora and Cheiroptera, of which the fossil remains are found in the phosphate of lime deposits at Caylux, Tregols, and Concots. He further describes the jaw of a cat, which he names *Pseudelurus Edwardsii*, and another animal which is a link between the cats and the *Mustelidæ*. At Tregols is a breccia composed of the bones of bats.

"Towards the close of the Post-tertiary period the land of passage by which the plants and animals migrated to Ireland broke up. This preceded the last of the series of changes in the physical geography of Britain, which comprised the separation of the British area from the Continent, and ended in the present distribution of land and water."—*Tate's "Historical Geology."*

NOTES AND QUERIES.

Colours by Candle-light.—Can any of your correspondents inform me why blue flowers look so differently by candle-light? Annual larkspur retains its vivid colour. The new Myosotis looks black. *Vicia cracca* and the perennial Veronica, found in old-fashioned gardens, are a very red lilac. *Ageratum Mexicanum* is much the same as by daylight. I only give these as instances. In water-colour drawing, we know that Prussian-blue looks blue by candle-light, and cobalt looks black. I should think that a microscopist might find various problems in my question.—*S. Horsley.*

Collection Catalogues.—Evidently the composer has as much difficulty in understanding my plan of indexing (see page 175), as I have in explaining it. In setting up the example, he has placed "Elm" under column D, and "Eagle" under F, whereas they ought both to be under E. These errors, although palpably only typographical, may have puzzled some readers.—*Alex. E. Murray.*

Hymenoptera in Town.—During the hot days of last month my brother brought me a specimen of *Uroceras gigas* which he caught in Cheapside. It was stunned, but the movements of the abdomen and long ovipositor might well cause certain misgivings as to its friendliness towards us when in bodily health. The appearance of this hymenopterous insect in the city does not appear to be a common occurrence. Perhaps the fact will be interesting to your readers.—*Theodore C. Izod.*

The Liver (p. 163).—The Yellow Iris would hardly apply to the Mersey, it being a large tidal river with salt or brackish water. Besides, the real Liver "pool" was not a marsh, but a flooded inlet of the stream. This pool, I am told, formerly ran up to Church Street, of which fact, authentic proof has survived to the present generation, though now all covered in. Further, the form *Liver*pool is the more recent name, as before stated; its older form being *Lither*pool.—*A. H.*

Hunting for Insects' Eggs.—This is a pursuit which may be "strongly recommended" to all those who take an interest in Entomology, and the microscopist also will be able to turn to account the objects he finds. It cannot be said, indeed, that it is "all prizes and no blanks;" and some of the surprises one meets with are a little unpleasing. Thus, in Swanscombe Wood, during last June, I found on an oak-leaf twenty-six eggs, arranged most regularly in rows, forming a sort of square. To my eye they seemed like those of some large moth, possibly of rarity, as they were of good size, and not unlike those of the Eggers. Much to my disgust, when they hatched out, there appeared on the leaf no caterpillars, but a party of larvæ evidently belonging to the Hemipterous order—*vulgò*, the Bugs. Curious and squat creatures were they, with striped bodies, and antennæ of remarkable length in proportion. I was not, however, tempted to try to rear them.—*J. R. S. C.*

Influence of Gas upon Plants.—In addition to what has been said on this subject, it may be remarked that among the substances, either present in gas or the products of its combustion, are sulphur compounds; as bisulphate of carbon, sulphide of hydrogen, and possibly sulphuric acid vapour. These are not only not "food for plants," but, on the contrary, inimical both to animal and vegetable life. But, as recommended by your other correspondents, syringing with clear rain or other *soft* water, combined with the other usual precautions, will enable window gardeners to keep many plants in health and vigour.

Coloured Hawthorn.—I have two fine hawthorn bushes. The flowers used to be pink, but are now white, with only a pink tinge when the blossom is going off. Can any correspondent say if there is any means of restoring the colour?—*E. T. S.*

Microscopical Societies.—Can any of your correspondents inform me where to obtain a list of the Microscopical Societies in Great Britain?—*S. Ireland.*

Gamekeepers and Zoologists.—A gamekeeper passing through a field near my house, a few days ago, called to me that there was something in one of the traps (set for rabbits). On going, I found a fine weasel in it. After examining it, as it was a beauty, I asked if it was of any use. "No, only to throw away," was the answer; adding that he had caught a *white* one in a trap a few days ago. "But you did not throw *that* away?" "No, I gave it to Joe Green, for stuffing." Let me beseech all young naturalists to make the acquaintance of gamekeepers, particularly of *old* ones. It is astonishing what an amount of rare objects may be brought to light by these means. If you meet with a bird, or a fish, or an animal you may not happen to know, take it to some old gamekeeper. If you want to know if such or such a bird, &c., was ever known in the neighbourhood, ask the "old keeper." If you want to *start* a little museum, engage the assistance of all the old keepers. We had an "old keeper" employed in our woods in winter. This old worthy was a mine of information on all matters relative to flood and field, and, having once charge of a very extensive marsh (Martin Mere), it would make one's mouth water to hear him tell of the bitterns, the ruffs, grebes, "and lots of birds that *nobody knowed nothing about*," formerly met with there. This person once brought me a dabchick, and another time a hoopoe, and, lastly, a couple of Bohemian wax-wings.—*Thos. Williams.*

Where are the Swallows?—A correspondent notes the disappearance of swallows from some accustomed haunts near Hampstead. It may be of interest to note that they have appeared this season in considerable numbers south of the Thames, in localities, as at Brixton, where they have not previously been noticed.—*A. H.*

Squirrels and Fruit.—I observe in your November number some remarks on Squirrels, and I am now in trouble, for some of these little animals get to my cherry-trees, and play havoc with my fruit; and I am told they will get my strawberries when they find them out. If this be so, I am in fear they will annoy me by getting my plums and wall-fruit. If some of your correspondents can tell me if they generally are annoying unto fruit, or can suggest any remedy that I can adopt to keep them off, I shall be obliged.—*N. S. W.*

Bees in a Strange Place.—A week or ten days ago a swarm of bees was found to have taken possession of the small cart-box in front of one of my farm-carts. They had probably been there a few days before they were discovered, for they had built a comb half as large as my hand. The cart was in constant requisition for carrying hay; so every time it had to go to the field, some half-mile distant, the lid of the box was closed, and the bees were taken for a ride. The swarm was from the first but a weak one—probably a cast from a swarm—and this natural weakness, together with the constant disturbance, has caused the bees gradually to desert their comb, and they have all disappeared again. I was from home when they were first seen, or I might, perhaps, have found some means of preserving the bees that had found so strange a resting-place.—*Robert Holland.*

Optical Phenomenon.—I am very desirous to obtain an insertion of the following account of an optical phenomenon in Science-Gossip:—If the observer stand upon a hill, so that his shadow ought to fall upon the ground below at the distance of a quarter of a mile, instead of a shadow he will see a light many yards in height and breadth, which, like his shadow, will follow all his movements—proving that it represents his shadow. Now, if he descend the hill till the sun ceases to shine on him, the light will still remain, and will not finally disappear till the top of the hill is 22° above him! If he again mounts the hill, the light re-appears before he comes again into sunshine. This appearance is doubtless a form of diffraction, but I can obtain no solution of the mystery from any of my scientific friends to whom I have mentioned it, or who have observed it for themselves. Here I have only seen it at sunset, but in Switzerland it might probably be seen in the depths of the valleys at noonday.—*T. Ogier Ward, M.D., Oxon.*

The Resurrection Plant.—A few days ago a friend brought us a curious-looking dry plant, like a shrivelled brown moss-fern, with a dry fibrous root in the shape of a ball. This we were told had been seven years at least without water, and would revive if supplied with moisture. So we placed it in a tumbler of water, and certainly a sort of life did come back to the plant. Its roots expanded and its fronds grew moist, and stretched themselves. At the end of two days it looked alive. We now expected it to grow, and the more hopeful of us suggested a blossom, perhaps even of a brilliant colour. Nothing more occurred or seemed likely to occur, except a little mould on the brownish fronds. So we took it out of its tumbler in about a fortnight, and dried it up again. We know that it is a native of California, but we shall be glad if any correspondent would give its botanical name, or any particulars with regard to its history.—*M. A. D.*

Singular Flowering of Saxifrage.—I am anxious to tell you of, what seems to me, an extraordinary coincidence. The inclosed Saxifrage was gathered while in bud in Gloucestershire, on July 8th; put in blotting-paper, and then confined in a drawer till now, when it was found perfectly fresh and in full flower. Is it not rather a singular occurrence?—*Jessie Reeve.*

Migration of Newts.—Some friends of mine have a square pond cemented at the bottom, and with a high stone parapet all round it, except where a few steep steps come down to the water's edge. The pond was known to have a good number of newts in it. One day three very small pike were brought home and put into the pond. The very next morning a thick black mass was found clinging to the sloping brickwork at the side of the pond. The Newts had seen the pike, and straightway the whole tribe endeavoured to migrate, and clung one on to the other, vainly endeavouring to scale the parapet. They did get out (poor things) by human aid, but I doubt if their history extended further in the annals of emigration.—*M. A. D.*

Parasite on Hedgehogs.—This morning, while feeding a tame hedgehog, I noticed a singular-looking insect, apparently working its way among the spines. I tried to remove it, but it held on with such tenacity that I conjectured it to be a part of the animal's body. It was so buried in the flesh, that I was compelled to cut it out. Its body is of a pale slate-colour; the head, which barely protrudes beyond the body, is merely a brown spot about $\frac{1}{30}$ of an inch in diameter. It has eight legs of the same colour as the latter.—*Thomas C. Oborn.*

[It is the Hedgehog Tick (*Ixodes hexagonus*).—Ed. S.-G.]

A Snake Story.—The inclosed cutting is from the *Western Mail* of Monday, July 22nd, and may be interesting to the readers of Science-Gossip:—A correspondent says, a few days ago, Mr. George Stott, while walking along the side of a much-frequented brook near Abercarn, had his attention drawn to the peculiar movements of a snake about five feet long, which he captured and killed. On opening it, he discovered in its stomach a trout five inches in length, which appeared to have been but recently gorged.—*R. and M.*

Purpura Lapillus.—This mollusk is eaten by the good people of Hastings, in common with the Periwinkle, and is thought much nicer. It is sold at one penny the half-pint, ready cooked. The fisherman who was crying them told me the common name for them was *man-suckers*, a curious term, for which he could give no explanation, but said it was "what everybody in Hastings called them."—*A. W. L.*

Parasites.—Will you say in next Science-Gossip how I may get rid of parasites that infest a pet starling? The bird bathes each day, but the pests appear to affect the back of head and neck, where the beak cannot reach.—*G. T. J.*

Something about Spiders.—A few days ago I had the opportunity of seeing the manner in which these interesting little animals are enabled to ascend to any object without having previously fastened a web to it. Somehow I got a little spider on my hand, which began running about with no apparent object in view. I became interested, and watched to see what he would do. He commenced running round and round near the same spot (the tip of my middle finger): he soon stopped, and suddenly stood on his head. I could not make out what he was doing till I saw a fine web floating upwards to the ceiling; this he was projecting rapidly. When the web touched the ceiling, I suppose, for I could not see the end of it, he climbed up it some way, then stopped, came down, and, for some unknown reason, hauled it in. He now started a new web, which I think he pulled in before it touched anything. He had also the power of projecting his line horizontally to some distance.—*G. S., Jun., Oporto.*

Frog Spawn.—Last year the frog tadpoles were hatched on the 8th of April, this year on the 30th of March. This year the spawn was obtained on

March 14th; it was then obviously only just extruded, as the globules were in a clear compact mass, and not yet fully expanded. Older spawn was found at the same place this same day; also, several couples of frogs were still breeding.—*C. R. E.*

A Botanical Difficulty.—Will you, or any of your readers, kindly set me right in the following difficulty:—I find, on reference to Garrod's "Materia Medica" and Oliver's "Botany," they state that *Humulus lupulus* and *Cannabis sativus* belong to the natural order *Urticaceæ*, while Royle and Headland's "Materia Medica," Bentley's "Botany," and Squires's "Companion to the Pharmacopœia," state that they belong to *Cannabinaceæ*. Which is right?—*E. R. H.*

To Preserve Wasps' Nests.—A correspondent asks how to preserve a wasps' nest? I have never seen a wasps' nest preserved, but I have seen two very fine specimens of hornets' nests. They were taken out of the roof of a house. When all the hornets were out, the nests were put under a large bell-glass with several pieces of camphor. After being kept so for some time they were removed, and no smell was to be perceived, though they were full of larvæ. They were afterwards kept under a glass, and I think some camphor kept with them to preserve them from moth.—*T. B. Blow.*

Mice Entering Cages. — Like your correspondent "E. M. P.," I have been annoyed by mice entering cages against walls; but it has not occurred very frequently, and the only object of the visit was seemingly the seeds to be obtained from the floor of the cage: those in the glasses were rarely touched. In one instance a mouse showed some dexterity in paying his nocturnal visit, as the cage was hung high up, and to get in the mouse must have made an angular leap from the edge of a shelf. From the examination of the cage on successive days, it was evident these visits were repeated, probably by the same animal. There was an old and very tame canary into whose cage a mouse would enter, sometimes even in the day if the apartment was deserted. The bird did not seem alarmed at its visitant, and if any one entered the room, the artful mouse would keep quite still at the bottom of the cage, and only on the observer coming up close, would it make a sudden dash at the wires and effect its escape.—*J. R. S. C.*

A One-legged Bullfinch.—I possess a bird of this species, which by accident lost one of his legs, but which, nevertheless, is more active than some birds possessing the natural number of these valuable supports. His greatest achievement is to stand upon his stump and scratch his head with the yet remaining limb. If his cage-door be left open, he will leave it and hop rapidly along the table, eluding the grasp with dexterity. Though he always goes to roost upon his perch, he almost invariably loses his equilibrium some time during the night, and is compelled to repose thereafter at the bottom of the cage, since he is far too sagacious to exhaust himself by making a succession of attempts to reach the perch in the dark. But it is odd that he seems to "abhor a vacuum;" he is never to be found asleep in the morning in the middle of the cage, but hobbles up to one of the sides, against which he steadies himself. He will occasionally eat at night, an unusual thing with English birds, though common amongst canaries.—*J. R. S. C.*

"Moth among Clothes."—Having just been told by a lady friend the best method she has ever tried for the preservation of clothes from the ravages committed by moths, I think I can hardly do better than let "W. M. M." have the benefit of my friend's recipe. It is simply this:—Obtain from a chemist a small quantity of "bitter apple powder," and sew it up in little silk bags. Place one or two of these among the clothes, and no moth will ever venture to thrust either its proboscis or its ovipositor within a goodly distance of the bag, box, or drawer wherein the powder lies.—*L. V. H.*

Silver in Surrey.—Three weeks ago some workmen were excavating and forming a reservoir for the waterworks at Moulsey, when, about thirty feet below the surface of the earth, they discovered a quantity of silver ore. A specimen of the quartz shown to me appeared to be richly impregnated, the ore running in large veins. Of the quantity found, and the extent of ground it covered, I have not been able to obtain any definite information.—*Thomas C. Oborn.*

White Varieties.—A white variety of *Centaurea nigra* exists in several localities about here. [Although not lessening the pest of the plant to the agriculturist, nevertheless it interests the botanist by its pretty white tufts.—*W. T. Iliff, Epsom.*

Fighting Ants.—As I have already stated in a previous number, I am much troubled with red ants, which completely overrun my garden, twenty or more colonies being established under one wall. I can only destroy them with boiling water, which also kills the border plants. Any other remedy will be thankfully received. The other morning I found my little friends had been engaged in sanguinary warfare; dead ants covered the gravel paths for a distance of about ten yards, while a numerous "ambulance corps" were very busy carrying off the dead. I have never found them actually engaged in battle, so I suppose most of the fighting is done at night, as the dead are very numerous in early morning. If they go on at this rate much longer, there will be no further need of boiling water! judging from the multitudes of slain.—*John Henderson, jun., Reading.*

Chameleons Utilized.—It occurred to the writer of this, some years ago, that it would not only be highly interesting to keep chameleons for the sake of observing their extraordinary habits and mode of existence, but also that it would be highly profitable to keep them as domestic pets, for the purpose of lessening the torment and annoyance we suffer from our common house flies (*Musca domestica*), and other more strange and travelling insects; and that for this utilitarian purpose chameleons should be cultivated in those climates they are natives of. They would live comfortably in our dwelling-houses, and certainly in such rooms as are used as sitting-rooms, and where a fire is constantly kept. Thus, by keeping these most interesting creatures, who are unlimited warfarers against flies, gnats, and all other such "small deer," we might study and learn much that would be instructive, and at the same time we could get rid of the accursed plague of house flies and of numerous other insects.—*W. Mawe.*

Larva of a kind of Gnat.—There is a very transparent larva of a gnat which sometimes abounds in clear ponds, a description of which is given in various books; but I have not seen its food particularly mentioned. It feeds on other animals, and I have found the common blood-worm in its stomach. This is a curious object for the microscope, as by pressing the creature between two glasses the stomach is inverted, and forced out of the mouth, when it is seen to be covered with rows of spines pointed backwards, I suppose to retain its food.—*E. T. S.*

Starch in Geraniums.—I see that the pith in geraniums has its cells pretty well filled with starch. Can any one inform me if many other of our English herbaceous plants resemble geraniums in this respect, as I have not noticed the same thing in any I have tried? Of course I do not refer to arums or bulbous plants. The grains of starch are small and irregular, but they show the cross well with polarized light.—*E. T. S.*

Honey.—On what plants do the bees which gather the honey sent from Narbonne feed, and will they grow in this country? There are three kinds of pollen in the honey: one resembles a ball with the equators set at right angles to one another; the second and commonest is of an oval shape; and the other round, and set with spines,—I expect from a syngenesious plant.—*E. T. S.*

Thynnus vulgaris (the Tunny of the Mediterranean).—A fine specimen of this fish was taken in the Laira, at the mouth of the Plym, near Plymouth, on the 22nd of July last. It measured 9 feet long, was 5 feet 10 inches round the body, and its tail was 3 feet wide. A photograph was taken by Mr. Ramsey. I have several of the scales left, and shall be happy to send them to any one in exchange for Lepidoptera.—*John Purdue, Ridgeway, Plympton, Devon.*

Irritating Effects of Caterpillars' Hairs.—I have found the short hairs on the outside of the cocoon of Oak Eggar (*Lasiocampa Quercûs*) very annoying. The hairs of *A. Caja*, the common Garden Tiger, are also possessed of urticating properties when in cocoons; the living larvæ of both have no irritating effects whatever on my hands when handled, however carelessly.—*John Henderson, Jun.*

Charas.—Will any correspondent kindly tell me the best method of drying these plants? They are so extremely brittle that I have much difficulty in preserving them.—*S. M. P.*

Rockwork for Aquariums.—Very beautiful specimens of rockwork, suitable for small aquariums, may be obtained by melting broken glass bottles in a furnace. When intense heat is applied and the glass kept in for a great length of time, it will come out almost purely white, and often in the most beautiful forms.—*Jos. Laing.*

"Rural Natural History."—On looking over Science-Gossip for the year 1867, at page 86 I came on the above heading; and on reading it discovered three cures for whooping-cough, as stated by Mr. R. Holland to be used by the inhabitants of Chesire as infallible for the chink-cough, which is identically the same name used in this locality for whooping-cough, with nearly the same remedies used.—Recipe No. 1: A lock of hair off a person who has never seen his father, to be tied round the child's neck. No. 2: Hairy caterpillar, or granny, if met with accidentally, to be wrapped up in a cloth and tied round the child's neck. No. 3: If the parents of the child see any one riding on a piebald horse, they are to follow him, and ask what cure can he give for "chink" cough, and whatever he says is a certain cure, no matter what. No. 4: A miller of the third generation of millers is to take the child, and hold him in the mill-hopper while the mill is going: a certain cure is effected. No. 5: Take the child, and pass him three times underneath an ass and over his back. I agree with Mr. Holland that it would be most interesting if a collection of curious and superstitious remedies about plants and animals, which prevail amongst the people, were collected from time to time, and recorded in Science-Gossip.

Net for Geometers.—The dusk of summer evenings is one of the most favourable seasons for netting moths of the Geometer family; but even when they are fairly inside one of the ordinary nets, it is a difficult matter to see them. If, however, a net made of thin white calico be used, the moths are easily seen, and as they always settle down when caught, they are easily boxed.—*E. C. Lefroy.*

Saffron (*Colchicum autumnale*) grows very plentifully about here (Much Wenlock) in the pastures, and is a great nuisance to the farmers, as they are obliged to have it pulled to prevent their stock being poisoned by it. From personal observation, I am able to state that it flowers in September, bearing only one purple flower on each stem; but no vestige of a leaf. The leaves appear the following April and May. The seed-bearing stem springs up in the midst of the leaves.—*J. S.*

Heracleum giganteum.—Can any reader of Science-Gossip tell me the real name of a plant, the seed of which is sold in various shops as that of *Heracleum giganteum?* This, of course, is given on account of the size to which it grows, but gives no clue to what the plant really is. It is umbelliferous, and the stem is maculated as that of the hemlock; but, unlike that plant, is rough and hairy, and the leaves much thicker and coarser,—some four feet across. Indeed, it appears to be a sort of water-hemlock, or *Cicuta virosa;* but it grows in my garden to the astonishing height of fifteen feet, and has a head of bloom from a foot and a half to two feet across. I was told it was a biennial, but I have had it flowering for two successive years. Last year it was not more than half its present height. Will it grow any higher next? Shade and plenty of wet seem congenial to it. It would make a noble ornament for the wilderness part of a garden.—*J. H. G.*

Curious Turbot.—Dr. Norman, of Collingwood House, writes to *Land and Water:*—Mr. Samuel Amis, fish-merchant, of King-street, in this town, has kindly forwarded me a very extraordinary turbot, weighing about 12 lb. The dorsal fin of this fish terminated near the head in a thick curved projection resembling the vignette of a malformed brill, in "Yarrell's British Fisheries," vol. ii. p. 242. The head and gills were perfectly smooth, and of a light flesh-colour; the belly, instead of being white and flat, was exactly like the upper side, and studded with the usual tubercles; moreover, it was remarkably convex, or plump, as Mr. Amis rightly called it. I have seen several turbots with the same skin on both sides, but perfectly flat, and our oldest fishermen do not recollect one with the belly resembling this.

NOTICES TO CORRESPONDENTS.

We must remind our friends, who make use of this column that the following rules should be strictly adhered to:—First. That perfect specimens be sent. Secondly. That all the information as to habitat, &c., that the inquirer can give should be forwarded with them. Thirdly. To bear in mind that drawings, unless very perfectly executed, are useless, and a tyro is very apt to omit some distinctive characteristic which would enable the examiner to decide the genus and species of the object sent. Lastly. Never to send an object for identification until the inquirer has used his best endeavours to find out for himself all the information he requires. Questions are very frequently sent, which the slightest effort on the part of querist in looking through some elementary treatise would have given all the knowledge required.

W. O. Nicholson.—The parasite on owl is a bird-fly (*Ornithomya*), especially common on the Short-horned Owl.

G.—The eggs on the feather sent were laid by *Lipeurus ebræus*, one of the Anopleura.

Edwin Smith.—The former scales are those of *Seira Buskii*, one of the *Poduradæ* (formerly included in the genus *Degeeria*, but now separated from it by Lubbock). The others are either from the *Petrobius maritimus* of our coasts, or from the inland species of *Petrobius*.

T. C. Oborn.—The insect taken from the Hedge-hog is the common "Hedge-hog Tick" (*Ixodes hexagonus*), and, from its size, doubtless a female.

W. B. C.—The insects are *Anobium striatum*, and are always destructive to furniture. The only certain remedy (applied in the case of rare and valuable carvings) seems to be the saturation of the wood with corrosive sublimate by means of hydraulic pressure. Mr. Rye, however, recommends, as a possible remedy, a good soaking with boiling water containing carbolic acid. See zoological paragraph in present number of Science-Gossip.—C. G. B.

W. A. Luff.—Nos. 1 and 2 are *Strachia oleracea*. 3. *Carpocoris nigricornis*. 4. *Brachypelta aterrima*. 5. *Œdipoda cærulescens*. Nos. 1 and 2 are British species, but not common; 3 is rare; 4, not British; and 5 is reputed British, but there are no authentic examples.

F. V. Edwards.—Feed your anemones on small pieces of mussels, or fine raw beef about once a day.

E. W.—Thanks for the slides, which are admirably mounted. You had best consult Stephen's "Illustrations of British Entomology" for the names. The plant is *Equisetum arvense*.

Henry Taylor.—Your specimen appears to be *Nostoc commune* (*Tremella terrestris*, Dill.). Its reproduction is by spherical cells, placed irregularly in the course of filaments, from which they finally become separated. Try a little lime for removing it.

Lydia, M.P.—See above paragraph.

W. E. Sharp.—The eggs sent are—Nos. 1, 2, and 3, those of the Green-finch (*Fringilla chloris*), and No. 4, Pied Wagtail (*Motacilla Yarrellii*).

T. Baker.—The wine-bottle cork seems to be permeated with the mycelium of some fungus, probably *Mucorina*; but, unless in fruit (which it is not), it is difficult to determine. Careful scaling the tops of the corks will prevent it, unless the cork is already attacked, in which case it is useless. This phenomenon is the equivalent of "dry-rot" in wood.

Henry Pearson.—Your mosses arrived all jumbled together, so that it was impossible to know how you had numbered them. They should be properly and separately mounted before sending, and not loose. Send others.

W. E. H.—The phenomenon is very curious, but not unusual. See Dr. Master's "Teratology."

W. C.—Many thanks for your present of Lichens.

Mosses.—1. *Hypnum striatum*; 2. *H. molluscum*; 3. *H. cupressiforme*, var. *ericetorum*; 4. *H. cuspidatum*, and *H. fluitans*; 5. *H. cupressiforme*.—*R. B.*

Dr. J. P. H. B.—1. Your *Cuphea* (which we suppose to be identical with that described by you in Science-Gossip for 1871, p. 187) is the *C. platycentra*, Barth., which is figured and described by Mr. Robert Holland at p. 81 of the same volume. Griesbach refers to its naturalizing itself in the West Indies, and cites *C. micropetala*, Kth., as a synonym. 2. Yes; *Veronica arborescens*. 3. We regret that we cannot identify from your description the conifer known as "Jerusalem Candlestick;" we will, however, bear it in mind.—*B.*

Mrs. Marland.—The slug sent is *Testacella haliotidea*. See Tate's "British Mollusks." London: Hardwicke.

J. Crichton.—See article on "Collecting and Preserving Flowering Plants and Ferns," in the May number of Gossip. Mrs. Lankester's "Plain and Easy Account of British Ferns" (London: Hardwicke) will furnish you with all the information you want.

Anonymous.—We are obliged to adhere to our rule of not attending to anonymous correspondence.

Jos. Laing.—The egg is that of the Yellow-ammer. The crystals are selenite, or sulphate of lime.

T. P.—It is most likely the larva will come out next season.

S. M. P.—The specimen is *Chara hispida*.

James Crichton.—Your specimen is Liverwort (*Marchantia polymorpha*).

EXCHANGES.

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

Erratum.—Mr. Ford's address in last month's Gossip should have been "Stamford" instead of "Hamford."

Aulacodiscus Kittoni, with 6, 7, or 8 processes, offered for one with 5 or 10.—Mr. Hamrele, 46, Charlotte Street, Hull.

Six slides, illustrating anatomy of Calabar Beetle (*Pentondon quadreus*), offered in exchange for six other correctly named slides. Animal structure preferred.—Edward Ward, 9, Howard Street, Coventry.

British dried plants to interchange.—J. Harbord Lewis, 180, Mill Street, Liverpool, S.

Duplicates.—*Io polychloros, semele, rhamni;* Larvæ of *jacobæ;* Eggs and imagos of *auriflua;* Eggs of *sambucata*. Offers requested.—William Mann, 17, Wellington Terrace, Clifton, Bristol.

Eggs of Kingfisher, Cuckoo, Hawfinch, Curlew, Oystercatcher, Mute Swan, Bernicle Goose, Sparrow-hawk, and Kestrel Hawk, for other good eggs. Unaccepted offers not answered.—Fred. Anderson, Alresford, Hants.

Parmelia parietina, on receipt of good unmounted object and stamped addressed envelope.—C. J. Jones, Gilmore Range, Shaw Heath, Stockport.

Æcidium rubellum for unmounted object.—Address, enclosing stamped envelope, W. Dutton, 17, Hewitt Street, Hightown, Manchester.

Dendritic spot on paper and other slides for mounted objects.—T. W. Cowan, Horsham.

Good Slides, or payment, for specimens of Mole Cricket Hornet, large green Grasshopper, *Blatta gigas*. Fresh specimens preferred.—C. L. Jackson, Clarendon Terrace, Bolton.

Foreign Shells, with name and locality, in exchange for British Birds' Eggs.—F. Chester, 30, Smollett Street, Kensington, Liverpool.

Wanted, Silicious Cuticles, &c. for polariscope, in exchange for Diatomaceæ and other good objects.—H. E. Freeman, 1, Rose Villas, Wood Green, N.

For portion of skin of British Shark, or Dog-fish, send stamped and directed envelope, with object of interest. Mounted slides preferred.—Direct, F. S., Post-office, Rugeley, Staffordshire.

British Lepidoptera in exchange for either British or Foreign Lepidoptera.—T. Pickin, Mount Fields, Frankwell, Shrewsbury.

Hairs from seed-pod of *Leucodendron argenteum* (Zanzibar), mounted for polariscope; Pollen of Mallow, Cluster-cups from Willow-herb, &c., for other well-mounted objects.—J. Ford, Stamford.

Vertigo pygmæa for *Helix fusca; Helix lamellata* for authentic specimens of *H. concinna*.—G. S. Tye, 58, Villa Road, Handsworth, Staffordshire.

Mountain Limestone Fish Remains for Old Red Sandstone species.—J. Hunter, Richmond, Yorkshire.

Larvæ of *Arctia caja* (Tiger-moth) for microscopic material. Send list.—Rev. Jno. Hanson, 14, Bagby Square, Leeds.

For scales of *Danias alcippus* and *Vanessa clelia* from West Africa (mounted) send two good slides to E. Lovell, Holly Mount, Croydon.

Palates (mounted) of *Helix, Limax, Patella, Littorina*, &c., Spiracles of Insects, &c., in exchange for good objects, mounted or unmounted.—Alfred Guthrie, Ward Road, Dundee.

BOOKS RECEIVED.

"President's Address to the Liverpool Nat. Hist. Soc."

"Stone Implements." By John Evans, F.R.S. London: Longmans.

"American Naturalist," for July.

"Canadian Entomologist," for July.

Communications Received up to 10th ult. from—W. G. S.—C. C. A.—L.—S. M. P.—J. C.—T. P.—J. L.—W. O. N.—G.—E. W.—F. V. W.—W. A. L.—W. B. C.—T. C. O.—E. S.—H. T.—L. M. P.—W. E. S.—T. B.—H. P.—W. E. H.—W. C.—J. C.—J. H. G.—J. S.—E. C. L.—J. L.—S. M. P.—J. H.—J. P.—E. T. S.—W. M.—W. T. I.—L. V. H.—J. R. S. C.—T. B. B.—E. R. H.—C. R. E.—G. S.—G. T. J.—A. W. L.—M. A. D.—J. R.—T. O. W.—R. H.—N. S. W.—A. H.—T. W.—S. I.—T. C. I.—S. H.—A. E. M.—W. C.—J. S. W.—F. K.—C. K.—W. S.—R. T. L.—W. E.—F. H. W.—H. A. A., &c.

COLLECTING AND PRESERVING.

No. IX.—LICHENS.

By the Rev. J. M. Crombie, M.A., F.L.S.

MUCH as it is to be regretted, it cannot be questioned that of those who have devoted themselves to the study of botany, lichenists have always been "few and far between." While flowering plants have had their hosts of enthusiastic students, and while other classes of cryptogamics have had due attention paid to them, the study of lichens has, up even to the present time, been but too much neglected. To many indeed the term conveys only some faint and confused idea, and though they know that there are plants so called, they are at the same time utterly ignorant of their nature. With flowering plants, ferns, mosses, seaweeds, and even fungi, they have at least some acquaintance, more or less accurate; but lichens they generally pass by with indifference, regarding them merely as "time-stains" on the trees, the walls, and the rocks where they grow. Nay, we have even met with some professed, and otherwise well-informed botanists, who, while recognising certain of the larger and more conspicuous species as lichens, yet fancied that many of the smaller and more obscure species were merely inorganic discolorations. It is certainly very difficult to account for such a state of matters at the present day, when so much attention is being paid to almost every other class of plants. Vainly have I sought either in the nature of the case itself or in my conversations with botanists, for any intelligible solution of such apathy and neglect; though many good and sufficient reasons have presented themselves to my mind why they should be regarded in a very different light. It cannot with any show of propriety be objected that lichens are an uninteresting class of plants, and consequently undeserving of serious study. So far from this, they are in various respects as interesting not only as any other class of cryptogamics, but also as many other plants, which occupy a higher and more conspicuous place in the scale of vegetation. Being as it were the pioneers of all other plant life, for which they serve to prepare the soil on the coral islet and the barren rock,—constituting the most generally diffused class of terrestrial plants on the surface of the globe, from arctic lands to tropical climes,—presenting essential simplicity of structure, being composed entirely of an aggregation of cells, though at the same time this is amply compensated for by endless variety of form,—adorning as they do, with their variously coloured thalli and apothecia, the most romantic and the most dreary situations,—affording in some cases valuable material for the dyer and the perfumer, nay, even for medicinal purposes,—supplying, as some of them do, more or less, nutritious food for man and beast, under circumstances and in regions where no other can be had,—it is very evident that the prevailing neglect of them cannot arise from their being in any way uninteresting, and destitute either of beauty or utility. Nor does this, as might be inferred, result from any peculiar difficulty attending their study. There indeed seems to be a notion prevalent, not only amongst the students of phænogamic, but also amongst those of cryptogamic plants, that there are, somehow or other, almost insuperable difficulties connected with the pursuit of Lichenology. Now, it is quite true that the correct study of these plants is by no means an easy one, and that an accurate knowledge of them is not to be obtained in a day or an hour; but the same may, with equal truth, be said of any other branch of Phytology, which requires minute research and microscopical examination. Here, as elsewhere, there is no royal road to learning, and the difficulties which lie in the way must be boldly faced. If the student can only muster up sufficient courage to cross the threshold, and prosecute his investigations with zeal and steady perseverance, he will find in this, as in other cases, that the difficulties which looked so formidable at a distance, will, one by one, be successfully surmounted.

But to whatever cause the paucity of lichenists, both in our own and other countries, is to be attributed, it certainly does not originate in any difficulty connected with their collection and preservation. In fact, there is no other class of plants, where these, and more especially the latter, can be so easily effected, at a little expenditure of time and trouble. A few simple directions are, therefore, all that are necessary to be given on these points. As to the collecting of lichens, it has already been intimated that they are almost universally distributed, though of course in this respect subject to the same laws as the higher orders of vegetation. In our own country we have now a list of about 800 species, constituting by far the greater proportion of the Lichen Flora of Europe. In most parts of Great Britain and Ireland, a very fair number of these may readily be gathered, capable, as they are, of existing in almost every situation where they can derive requisite nourishment from the atmosphere. On the rocks and boulders of the seashore and the mountain-side, on the trunks and branches of trees in woods and forests, on peaty soil of bare moorlands, and on stone fences in upland tracts, nay, even on old pales and walls in suburban districts, a goodly harvest may generally be reaped. Few localities indeed there are, within the area of these islands (London and its environs, where the atmosphere is so impregnated with smoke, being the chief exception), in which the lichenist will find his occupation gone. True, it is only in some more favoured tracts, chiefly maritime and montane, that he can expect to meet with many of our rarer species; but even in most lowland districts, especially such as are well wooded, he may, with profit, pursue his researches, and collect various of the more common species. These will just be as useful in making him acquainted with the structure and physiology of lichens as though he had gathered the rarest that grow on Ben Lawers or by Killarney's lake. The apparatus requisite for collecting is neither complicated nor expensive.

A tin japanned vasculum, or what is perhaps better still, a black leather haversack, of larger or smaller dimensions as the case may be, suspended over the shoulder by a strap, is of course indispensable for holding the specimens gathered. The latter of these we have found to be more generally convenient, as we can take it with us also for a short ramble, without its attracting so much attention from curious rustics, as the less-known and more singular-looking vasculum. Two sets of instruments are also necessary for removing the plant from the substratum on which it grows, as well as for breaking off in many cases a thin portion of the latter along therewith. These are a geologist's hammer and chisel for such as grow on rocks, boulders, and stones; a gardener's pruning-knife for such as grow on trees, pales, and the ground; as also an ordinary table-knife for detaching, by insertion under them, such foliaceous species as can thus be separated from the substratum. To these must be added several sheets of soft and moderately thick paper, cut into different sizes (some newspapers suit remarkably well), in which to wrap up the individual specimens and prevent them rubbing against each other; a few card-boxes also, of various sizes, in which for greater safety to place any of the more brittle species, or fragments of the rarer ones, by themselves; and a pocket lens of good magnifying power, by which we may be able to detect on the spot those minuter species which the naked eye can with difficulty distinguish. With these the lichenist is fully equipped for an excursion, whether "near at hand or far away," and, with waterproof and umbrella, is ready to take the field even in threatening weather. A good deal of discrimination must be used in the selection of specimens for removal, which, in all cases where such can be obtained, ought to be fertile, with both apothecia and spermogones fully developed. Hence, such as are too old or too young, may be passed by, as neither the spores nor spermatia, by which alone, in many instances, they can be determined, will be found in a normal condition, any more than the thallus itself. The specimens gathered ought in every case to be of sufficient size to show distinctly the character of the thallus and of the fructification. Where, however, the thallus, as it frequently does, spreads very extensively over the substratum, it will be sufficient to break off such a portion from the circumference towards the centre, as will give an adequate idea of the more important characteristics of the plant. This is a point of considerable consequence; for should a portion be taken off from the circumference alone, or from the centre alone, it will often be entirely unsuitable for showing the real nature of the plant, and be quite useless for purposes of description. A little experience, however, will serve to prevent the commission of a mistake, into which, judging from the number of imperfect specimens which are sent me to be named, beginners are very apt to fall. Practice will also in time enable the tyro to use the hammer and chisel in such a way as to obtain neat specimens of saxicole species—a matter of importance with respect to their subsequent mounting. As to the best season for collecting, I need scarcely remind the reader that lichens are perennial plants, remarkable for their longevity, and that during the whole year round they may be found in fruit. The lichenist has not to wait for any particular month or months, as other botanists have to do, before he can collect the objects of his search in a fully-developed condition. Spring, summer, autumn, and even winter, except when the snow conceals all vegetation beneath its white mantle, are all alike to him, and in each he will find every species of lichen in perfection. At the same time, he will be most successful after a shower of rain or a slight frost has fallen, inasmuch as, becoming swollen with the moisture then imbibed, many of the minuter species, which might otherwise be overlooked, are more readily perceived, and the foliaceous species more easily removed from the substratum to which they are more or less closely affixed.

Nothing more need be said on the collecting of lichens, as a short experience will be more useful than further details. We proceed, therefore, to give a few hints on their subsequent preservation. This is a very easy process, presenting no difficulty whatever, and occupying but little time. We shall suppose that the collector has returned from a successful expedition, with his vasculum or haversack well filled with specimens from all sorts of habitats. Opening the papers in which they have been wrapped up, he will take them out one by one, and place them separately upon a table, over which a newspaper has previously been spread. If gathered in wet weather, they ought not to be left long in the papers, as in this case they are very apt to become covered with mould. After allowing them to remain in this position till they are thoroughly dry, he may at once proceed with hammer and chisel, or with knife and scissors, to reduce to a suitable size such of them as he could not conveniently thus manipulate in the field. When this is done, they may then be affixed with gum, of a rather thick consistency, to slips of white paper, with the locality and date of their collection written beneath. There will be no difficulty felt in thus affixing saxicole, corticole, and lignicole species, though where the nature of the stone or wood is more absorbent, several applications of the gum may be necessary before they properly adhere. With terricole species, however, a somewhat more lengthened process is necessary, owing to the brittle nature of the substratum, in consequence of which, if not properly preserved, they often crumble into dust in the herbarium. To prevent this, M. Norman, of Trömsoe, Norway, has recently prescribed a solution of isinglass in spirits of wine, which, when liquefied in a vessel plunged in water of the temperature of 25°–30° C., is greedily imbibed by the earth, and becomes inspissated into a solid gelatine at a temperature below 15°. This solution may be applied until the earth becomes thoroughly saturated, and after it is perfectly dry, the specimen will possess sufficient hardness and tenacity, and may then be mounted like the others. So far, however, as my own experience goes, I have found a weak solution of gum-arabic, frequently repeated, and applied to the under surface and edges of the specimens, to be quite as efficacious; and if after becoming thoroughly dry, they be first affixed by a thicker solution to slips of thin tissue-paper, they will be equally ready for being mounted as above. Either of these two methods may also with advantage be applied to such species as grow upon decayed mosses. Slight pressure may be applied to the thallus of fruticulose, filamentose, and foliaceous species, in order that they may lie better in the herbarium; but this should be done only to a very limited degree, so as not to obliterate the normal appearance of the branches or lobes. As the character of the under surface of the thallus is frequently of great importance, at least in foliaceous and fruticulose plants, a portion of this, not necessarily detached, should be turned over, for facility of inspection, and pressed down on the paper, before the specimens have become quite dry and rigid. In order to destroy any insects that may be upon the plants when gathered, or by which they may afterwards be infested, lichenists at one time were in the habit of poisoning them with corrosive sublimate. Frequent exposure, however, to the air in dry weather, and the presence of a little camphor, will be quite sufficient to prevent any mischief from this source.

But having thus arranged, though the arrangement is but temporary, the specimens gathered, on slips of white paper, the next and most important point is their due examination and determination. This in the present advanced state of Lichenology, is unquestionably, in many cases, a task of considerable difficulty, and in the short space at our disposal, it would be quite impossible to give anything like an adequate explanation of the mode in which this is to be effected. Suffice it at present to say that sections must be made of the thallus to ascertain the character of its different layers, as also sections of the apothecia and spermogones to ascertain the nature of the spores and spermatia. For both purposes a good microscope, with $\frac{1}{4}$-inch object-glass, is absolutely indispensable to the student. The examination of the spores, upon which, in so many cases, the determination of the species chiefly depends, should present little or no difficulty, at least to the fungologist. It may be readily effected by moistening the apothecium with water, and then, with a dissecting-knife, making a thin vertical section through its centre. Putting this on a glass slide, or in a compressorium, in a drop of hydrate of potash, and then placing it under the microscope, a view will be obtained of the asci, spores, paraphyses, hypothecium, &c., each of which may afterwards be insulated and examined more minutely in detail. Take, for example, the well-known beautiful yellow lichen (*Physcia parietina*), so common everywhere on walls, rocks, and trees, and treat a very thin section of the mature apothecium as above. Under the microscope it will thus appear—

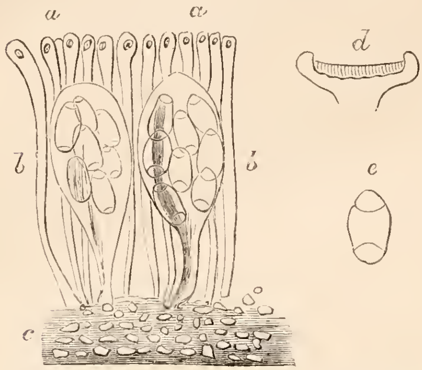

Fig. 148. Section of *Physcia parietina*. *a*, Paraphyses; *b*, Asci with spores; *c*, Hypothecium; *d*, Section of apothecium; *e*, Spore.

In the same way the spermogones may be examined, when the nature of the sterigmata and spermatia will be apparent. By cutting across the thallus of the above species, we can perceive even by the naked eye that it consists of three different layers, which when microscopically examined present the following appearance—

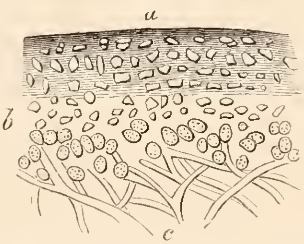

Fig. 149. Section of *Physcia parietina*, *a*, Cortical stratum; *b*, Gonidic stratum; *c*, Medullary stratum.

But in addition to this microscopical examination, it is also requisite to observe the different chemical reactions produced on the asci or the hymeneal gelatine with iodine (I), which will tinge these either bluish or reddish wine-coloured, or else leave them uncoloured. Similarly the thallus, including both the cortical layer and the medulla, may be tested with hydrate of potash (K), and hypochlorite of lime (C), the latter being applied either by itself or added to K when wet. In some cases no reaction will be produced by these either upon the cortical stratum or the medulla; in others they will be tinged yellowish or reddish. The formulæ for the preparation of these reagents are: for iodine, iodine, gr. j; iodide of potash, gr. iij, distilled water, ½ oz.; for hydrate of potash, equal weights of caustic potash and water; for hydrochlorite of lime, chloride of lime and water of any strength. After correctly ascertaining the specific name of the specimens collected, this is to be written on the slips of paper to which they are affixed, above the locality and date, and the best of them, including all varieties and forms, selected for subsequent mounting in the herbarium. This may be effected either in the same way as the mounting of phanerogamic plants, or by affixing the specimens to pieces of millboard covered with white paper, and arranging them according to the order of the genera and species in the system of classification which may be adopted. For facility of reference the latter is undoubtedly the preferable method; and if the cards are disposed in a cabinet with shallow drawers, they will not, so far at least as our British species are concerned, be found to occupy too much space.

Newcomen Road, West Finchley, N.W.

A NEW SPECIES OF PROTOCYSTIS.

DR. WALLICH, in a paper on some undescribed Testaceous Rhizopods, read before the Royal Microscopical Society, publishes a new genus of Rhizopods, which he had discovered in the North Atlantic soundings. This genus, he says, "is very scarce in the deposits, and he had not been able to detect a single specimen in which the sarcode body was even partially visible, although, from the general appearance and characters of the siliceous shell, it seems highly probable that they are related to the genus *Cadium*, Bailey. They exhibit one striking peculiarity, which is sufficient to warrant their being provisionally placed in a separate genus. I allude to the possession of a process which, in one variety at least, appears capable of being detached from the main body of the shell, as if it were constituted of a distinct and separate portion. To this genus I have given the name of *Protocystis*, leaving the exact nature of the sarcode body of this genus and of *Cadium* to be determined when an opportunity of examining their living tissues shall have been obtained."

Class *Rhizopoda*.
Order 3. *Proteina*.
Fam. 1. *Actinophryna*.

Genus PROTOCYSTIS (Wallich).—Shell siliceous, entire, hyaline, subglobular; surface of shell filled with minute circular depressions.

P. aurita.—Shell nearly orbicular; anterior aperture surmounted by two acuminate processes, which are bent downwards from the erect position; the processes are perfectly plain, the line of union between them and the body distinctly marked; diameter $\frac{1}{250}$ of an inch (fig. 150, *a*). North Atlantic deposits, in 871 fathoms. Fig. 150, *b*, the same, without processes.

P. globularis (Wallich).—This form resembles the last in general outline and marking of the siliceous shell, but the anterior aperture is not everted. It may be only an imperfectly developed variety.

P. cuspidata (Wallich).—Siliceous, hyaline; body oval, surmounted at one extremity by two, and at the other by a single mucronate process; surface of shell] grooved longitudinally and transversely striate.

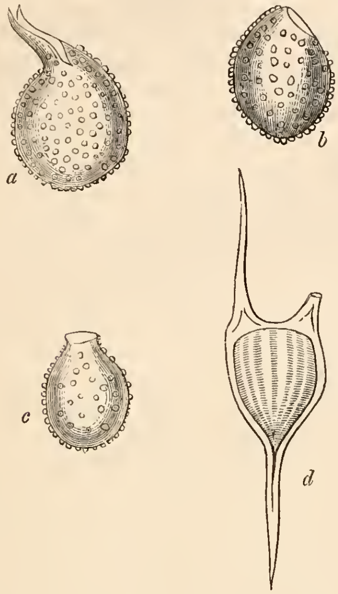

Fig. 150. *a. Protocystis aurita. b.* Ditto, var. *c. P. globularis. d. P. cuspidata.*

Only a single specimen, and that mounted in balsam, was obtained by me; thus no opportunity was afforded for tracing out its characters more fully.

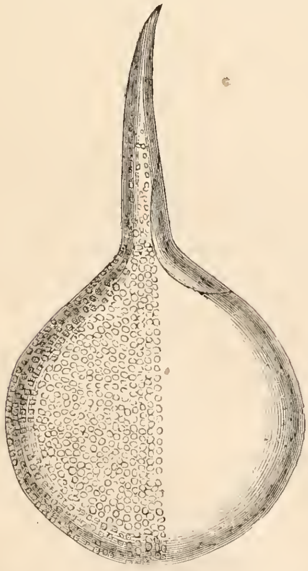

Fig. 151. *Protocystis Wallichiana*, × 400.

North Atlantic, 2,000 fathoms (fig. 150, *d*).

The preceding are all the species described and figured by Dr. Wallich. I have now to add another species to this remarkable genus, and I have great pleasure in naming it after that eminent naturalist and microscopist.

P. Wallichiana (Kitton).—Body siliceous, circular in front view, side view ovate; process single, straight, hyaline; surface of body finely punctate; colour in balsam pale brown. Fig. 152, a side view.

Algoa Bay Guano.

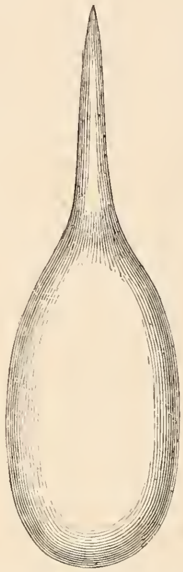

Fig. 152. Side view of *Protocystis Wallichiana.*

This very fine form was not uncommon in guano from Algoa Bay. My old friend and correspondent, the late J. Norman, Esq., of Hull, provisionally named it *Coscinodisus caudatus*, and I believe distributed slides of it under that name. In Dr. Wallich's description of the figures, *P. globularis* is called *P. lageniformis*, and *P. cuspidata*, *P. spinifera*.

F. Kitton.

FOSSIL MONKEYS.

In view of the discussion on the antiquity of man, and his probable descent, it will not be uninteresting to notice those quadrumanous animals which stood highest in the natural history scale before man made his appearance, and the relative epochs at which they lived. From the following brief notes on an article in the *Annals of Natural History* for September, it will be seen that some of the existing genera of monkeys have a great antiquity. The greater part of the fossil monkeys known up to the present day belong to the Miocene deposits. Dr. Falconer was the first to find them in the Miocene strata of the Sewalik Hills in Northern India, in 1836. In 1837 M. Lartet communicated to the Academy of Sciences the discovery of a quadrumanous animal in a Miocene fresh-water deposit at Sansan, which was subsequently named *Pliopithecus antiquus*. An allied species was found in 1862 in the fresh-water strata of the Molasse, in the canton of Zurich. This form, however, does not approach the anthropomorphic ape so much as the preceding. In 1856 M. Lartet described another anthropomorphous ape, which he named *Dryopithecus*. So much did the teeth of this species resemble those of man that they have been frequently mistaken for human molars. M. Fraas also described a species of fossil monkey, from the Miocene bed of Steinheim, in Würtemberg, which he believed belonged to a species of *Colobus*. It is in the Pikermi deposits in Attica, Greece, that the most numerous remains of monkeys have been found, but always confined to a single species, called *Mesopithecus Pentelici*. Of this, M. Gaudry sent to Paris the remains of no fewer than twenty-five individuals. Another Miocene monkey has been found in the sands of Eppelsheim, of the same age as the Pikermi beds. In deposits newer than the Miocene, the *Macacus pliocænus* has been found in the brick-earth of Gray's Thurrocks, Essex. The remains of another species, called *Semnopithecus monspessulanus*, have been found in the fresh-water marls of Montpellier, of Pliocene age. Another species, met with in the same beds, has been named *Macacus priscus*. Lastly, in the Brazilian bone-caves, five species of platyrrhine monkeys have been found, showing that the American type has been long in existence. One form, *Protopithecus brasiliensis*, surpassed in size the largest of the living American monkeys, the *Mycetes*, with which it had some relations. Altogether, nineteen species of fossil monkeys have been described. The Eocene deposits have as yet only furnished one species, of which the determination is certain. Until quite recently, fossil monkeys were unknown in the different fossiliferous formations of Italy, but Dr. C. J. F. Major has just described one belonging to the genus *Macacus*, which is nearly allied to the European form now inhabiting the rocks of Gibraltar. This fossil is believed to come from the Val d' Arno, and of Pliocene age. The animal was a contemporary of the *Elephas meridionalis*, *Rhinoceros etruscus*, &c. Another monkey, a *Cercopithecus*, is also announced as having been discovered in the lignite of Monte Bamboli, in Tuscany. Still another is represented by several teeth, &c., in the Pisa Museum, from a Pliocene lignite in the Val d' Arno. It will be seen, therefore, that if we are descended from the monkey family, we have more than one stock to choose from in the construction of our genealogical tree! J. E. T.

THE POTATO DISEASE.

By Worthington G. Smith, F.L.S.

THE stormy weather, and warm, humid air of the present season, have been peculiarly favourable to all fungoid growths; therefore, as might have been expected, the potato disease has been more than ever prevalent and destructive. Accounts reach us on all sides of the serious failure, or even total destruction, of the potato crops from the ravages of this insidious pest. How and when it was first observed, what it is, and how to extirpate it, are the three very serious questions which have occupied the attention of scientific men for nearly thirty years. The two first questions can now be pretty satisfactorily answered; but as for the third, it is an enigma which has at present baffled every attempt at solution.

A brief summary of what is known of the potato disease, with a new series of illustrations, drawn to a *uniform scale*, cannot fail to be of interest to all readers of Science-Gossip; and in writing this summary and engraving these illustrations, I am bound at once to disclaim all originality, and to say that for nearly all the facts known respecting the potato disease we are in the main indebted to the careful and accurate observations of the Rev. M. J. Berkeley. These observations, with those of Dr. Montague, Dr. Payen, De Bary, and others, are spread over the literature of the last quarter of a century, and as their perfect accuracy has now been confirmed by microscopists in every direction, little more can be done than to present these observations in their proper sequence and entirety. Therefore, it must be understood that I am briefly recording what I have seen of the potato disease, after being told what to look for, and how to see and understand it by Berkeley, and other of our foremost scientific writers.

The autumn of 1845 will be ever memorable as marking the great outburst of the potato murrain over the whole of Western Europe and the northern parts of the United States of America; the disease had, however, been very bad the previous year in America, and was even observed in Europe, and reported upon in that year by Desmazières, who read a paper upon it at Lille. Even in 1841 Dr. Morren detected it in Belgium, and then and there published a notice of the fungus, and some suggestions for contending against it, such as immediately removing the diseased haulm, &c. But even so far back as 1830 a disease of potatoes was observed in Germany, and called the "dry-rot;" and it is very probable that the first detection of the potato disease dates back for nearly a century. One year before its virulence reached its height in this country, viz. 1844, it occurred in its worst form in Canada, and a letter addressed to Dr. Bellingham in that year, and published in *Saunders's News Letter*, gives a graphic account of its ravages. The letter says:—"During the months of July and August we had repeated and heavy showers, with oppressive heat, and an atmosphere strongly charged with electricity. Towards the close of the month of August I observed the leaves to be marked with black spots, as if ink had been sprinkled over them. They began to wither, emitting a peculiar offensive odour; and before a fortnight, the field, which had been singularly luxuriant, and almost rank, became arid and dried up, as if by a severe frost. I had the potatoes dug out during the month of September, when about two-thirds were either positively rotten, partially decayed, and swarming with worms, or spotted with brownish-coloured patches, resembling flesh that had been frost-bitten. These parts were soft to the touch, and upon the decayed potatoes I observed a whitish substance like mould." From careful consideration of the earliest recorded cases of this disease, there can be little doubt of its American origin, or indeed from its dating back from a very early period. A superficial thinker might be inclined to fall back upon the theory of "spontaneous generation," and so account for the origin of the potato fungus, about 1840; but although *Peronospora infestans* belongs to a genus numbering some forty species, all more or less alike, and all parasitic upon living plants, yet the specific characters of *P. infestans* appear so distinct (such as in the peculiar swellings on the thread-like stems, &c.), that no observer of natural objects accustomed to distinguish one thing from another, could for a moment think of considering *P. infestans* as a mere form of some immediate ally. Its real origin, like the origin of all plants, animals, diseases, &c., probably dates into the far past, and is likely to be ever involved in obscurity. Nothing is so difficult (or even impossible) as to trace things to a beginning: this has often been attempted in regard to the diseases with which man is affected, but with little success; no one can tell how or from whence scarlet and typhus fever and other ailments *really originated.* Epidemic cholera is said to have originated in the delta of the Ganges in 1817; but it seems highly probable (if this or anything else ever *had* a beginning), that if a searching investigation were made, its real origin would date from remote antiquity. It is not generally known that the fungus which produces the potato disease is by no means confined to potatoes, but attacks other members of the family to which the potato belongs; for instance, it is very common on the fruit of the tomato, and has been detected on the common woody-nightshade, or bitter-sweet of our hedges (*Solanum Dulcamara*); it even does not confine itself to the family to which the potato belongs (*Solanaceæ*), but has been found upon *Anthoceris viscosa*, a member of the *Scrophulariaceæ;* therefore, in searching into the "origin" of *Peronospora infestans*, we not only have to look to the beginning of the potato disease itself, but to the diseases of such plants as the woody-nightshade and tomato. Little was *known* of the disease as affecting potatoes in this country till July, 1845, when it ravaged the south of England, the first printed record of its alarming advent appearing in a letter from Dr. Salter, in the *Gardener's Chronicle* for Aug. 16. So rapid and devastating now was its progress in this country, that Mr. Berkeley states few sound potatoes were to be found in Covent Garden market a fortnight after its first recorded appearance, and though at this time it had not reached the Midland Counties, yet in a few days it was general. At the beginning of September it was recorded from Ireland, and a few days afterwards from Scotland, at which time the full power of the potato murrain was expending itself upon the British isles. About this period (as now) the leading newspapers teemed with balderdash and the most alarming, absurd, and contradictory accounts, some writers attributing the disease to an epidemic resembling cholera; others to animal manure used in cultivation, to microscopic insects, railways, or electric influences; whilst some persons asserted it was a sign of the break-down of the potato-plant from over-cultivation; or that it was caused by the tubers being cut in pieces before planting. All the papers, grave or gay, had something to say about it, and the potato disease was even one of the stock subjects reserved to *joke* about in the Christmas pantomimes. On one stage a gigantic tuber was brought on surmounted by an equally gigantic aphis, a joking allusion being at the same time made to the *Aphis vast-tater*. So serious, indeed, was the state of things at this period, that three of the Governments of Europe issued commissions to examine into the cause of the murrain, and discover, if possible, the remedy. It has frequently been remarked, that just before a bad attack of the disease the leaves and stems of the potato become a darker green and appear more than usually luxuriant, as stated in the letter addressed to Dr. Bellingham above quoted. This has been accounted for from the fact that the mycelium of fungi is a great incentive to the production of the green colouring matter of leaves; we may, therefore, safely assume that this appearance is put on immediately after the germination of the spores upon the foliage and stems. So rapid is the growth of this parasite, that in four or five days after this germination the tissues of the leaves become traversed in every direction by the mycelial threads, and the fruit-bearing branches are protruded through the breathing-pores on the under side of the leaves, as shown in fig. 153. The parasite never appears on the upper surface, which is impervious to its attacks; but in perfecting itself, and producing its abundant fruit, it totally destroys the matrix on which it grows, and causes the leaves to putrefy and dry up. Perfect specimens are seldom met with on potato *stems;* but the destructive mycelial threads descend them, and so reach the tuber. The stem now, like the leaves, rapidly rots, and falls upon the earth an offensive mass. So rapid and fatal is the growth of this fungus, that in a few days it will spread from plant to plant over a large tract, and in less than a week turn every stem and leaf in the field to one rotten mass. Within these diseased stems are often found black masses of hardened

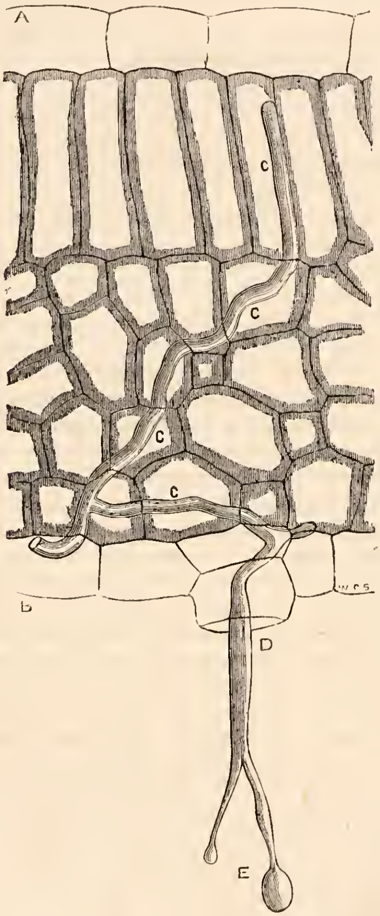

Fig. 153. *Peronospora infestans.* Five days' growth from a spore, enlarged 400 diameters.

threads, which are believed to be the mycelial filaments, in a resting and highly condensed but still living state: these black threads have been described under the name of *Sclerotium varium.* Another form of this substance, very common just under the bark of old trees, has been described under the name of *Rhizomorpha;* this is probably the mycelium of some *Polyporus* in a high state of condensation: similar threads have also been found on the woodwork of old coffins. Returning to the young condition of the potato fungus, we see it five days old in fig. 153, where the distance from A to B shows the thickness of the potato-leaf itself, magnified 400 diameters: A is the upper surface of the leaf, and B the lower. The mycelial threads or spawn, C, may be seen ramifying amongst the cellular tissue of the leaf, whilst the fertile thread is shown emerging through a breathing-pore, or stomate, D, and branching and bearing (at present) immature spores at E.

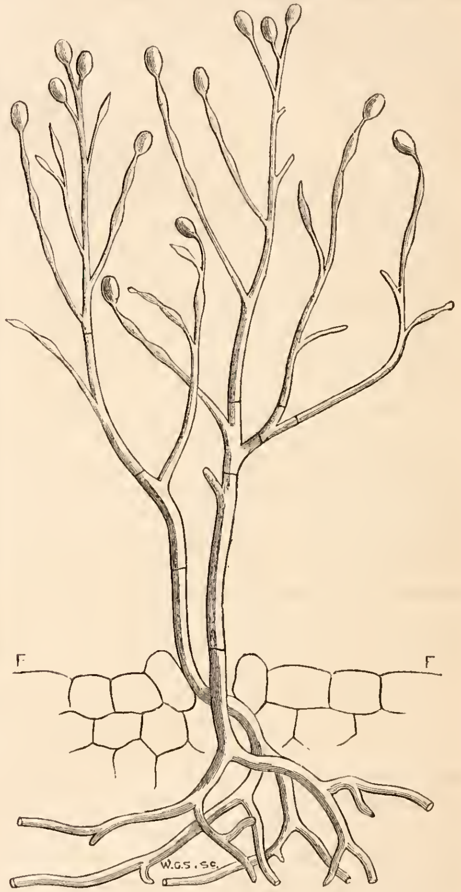

Fig. 154. *Peronospora infestans*, enlarged 150 diameters.

It is almost impossible to conceive of anything which could have a more damaging effect upon a plant than such a growth as this; for, leaving out the destructive nature of the mycelium within the leaf, the whole of the leaves' mouths, or breathing-pores, soon become completely choked up. It is somewhat analogous with a bad attack of croup in the human subject, with the addition of an external growth. Fig. 154 represents the mature condition of the fungus enlarged to 150 diameters only: here the characteristic swellings on the branched threads are shown, the stems bearing an abundance of spores (which are analogons with seeds and reproduce the parent) on their apices; the threads, as in the last figure, are seen emerging through a breathing-pore on the lower surface (here inverted, better to display the character of the fungus).

It is easy to see from this figure the damaging effect the fungus must have upon the plant: the fungus stems protrude from its mouths, and prevent the emission of perspiration; the potato-plant thus gets surcharged with moisture, which rots the stems and leaves, whilst the mycelium preys upon the tissues.

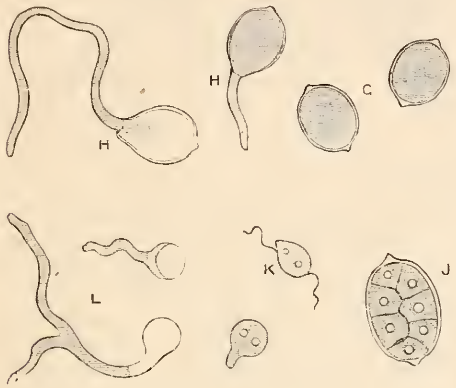

Fig. 155. *Peronospora infestans*, spores and zoospores, enlarged 400 diameters.

When the mature spores (G, fig. 155) fall from their apices, they readily germinate, as at H, H, by rupturing their outer coat, and discharging their contents: these contents immediately take the form of confluent mycelial threads, and produce the characteristic brown colour in the cellulose. The spores in this figure are enlarged 400 diameters, or to the same scale as fig. 153. In fig. 153, however, it must be remembered that the spores represented are immature. In the perfect condition of the potato fungus, *certain privileged spores* acquire greater dimensions than others, as shown at J, fig. 155; the contents of these privileged spores become differentiated, and produce within themselves a number of distinct nucleated cells, which at length are set free in the form of active zoospores, each zoospore being furnished with two thread-like processes (K), with which, when in fluid, they are enabled to move rapidly about. These bodies germinate exactly in the same way as the ordinary spores, by discharging their contents through the ruptured outer coat (L), and must play a very important part in the economy of the plant, for it is manifest that although they cannot move unless immersed in fluid, yet it can easily be imagined that during rainy weather, or after heavy dews, and when the leaves of potato-plants are all wet and blown against each other by the wind, a few zoospores, originating from two or three infected plants, would speedily contaminate a large field of potatoes: then, when we remember the hundreds of thousands of ripe ordinary spores blown about everywhere by the wind, their rapid germination, and immediate reproduction of other ripe spores and new zoospores, the rapid and fatal spread of the murrain remains no longer a mystery.

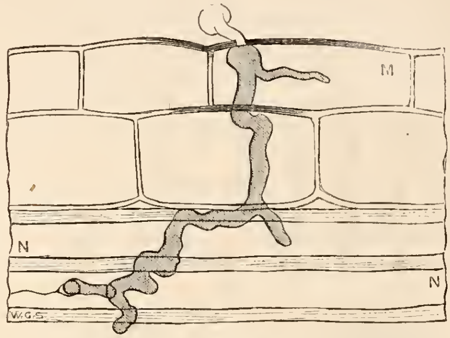

Fig. 156. *Peronospora infestans*, spore germinating, enlarged 400 diameters.

Fig. 156 shows a section through the stalk of a potato-plant, with a single mature spore germinating upon the surface, its mycelium penetrating the epidermis (M) and cortical layer (N N).

Now, not only is *Peronospora infestans* able to reproduce itself from its spores and zoospores, but amongst the mycelium in the intercellular passages of spent potatoes are found other bodies which there grow and fructify. These bodies, discovered by Dr. Payen, though referred to the *Sepedoniei* by Montagne (the order next in succession to *Mucedines*, to which latter order the genus *Peronospora* belongs), are considered by Berkeley and others to be probably a secondary form of fruit (oospores) of the potato fungus itself. These bodies, named by Montagne *Artotrogus hydnosporus*, are shown in

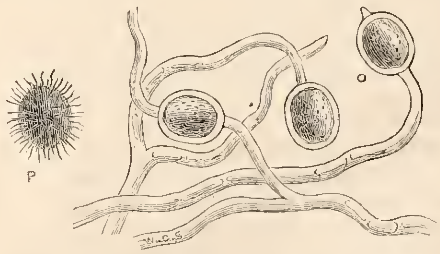

Fig. 157. *Artotrogus hydnosporus*, enlarged 400 diameters.

fig. 157 magnified 400 diameters; the young *Artotrogus* being shown at O in its mother cell (with threads), and at P free.

These bodies make the study of the potato disease more complicated, and its ultimate eradication far more difficult; for they do not germinate at once (as do the spores and zoospores), or perish, but remain quiescent for a whole season, till certain favourable external conditions cause them to burst from their sleep and reproduce the parent. Resting spores and dormant sclerotioid tuberiform bodies are very common amongst fungi, a very remarkable instance being found amongst the *Agaracini*. In *Agaricus tuberosus*, we have an agaric springing from a tuberiform base, which is invariably found growing from the dead remains of the previous year's fungi, generally the *Russulæ;* but we have found the sclerotia at the bottom of the tubes of some of the Polyporei, the perfect agarics emerging through the tubes.

Closely allied to the potato fungus is another species found infecting chickweed (*Stellaria media*), and named by Casparry *Peronospora alsinearum*. In this species, and some others of the genus, male organs, or antheridia, have been detected, as shown at Q, fig. 158, where the mycelial filaments are shown

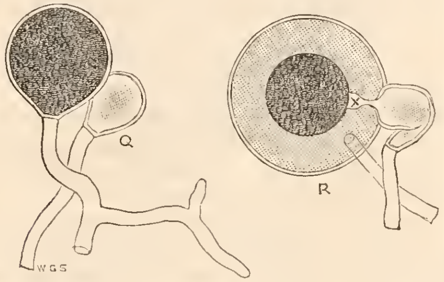

Fig. 158. *Peronospora alsinearum*, enlarged 400 diameters.

bearing the oogone, with which the mature antheridium is shown in contact: the contents of these cells are interchanged, and thus an oospore or resting spore is produced. At R is shown a section with the inflated summit of the fecundating tube of the antheridium (X) touching the gonosphere: this latter has a neat outline, produced by the membrane of cellulose which has just been secreted.

At fig. 159 (S) is shown a ripe oospore, furnished with its thick reticulated epispore, the surrounding protoplasm having almost disappeared; and at T a ripe oospore, whose epispore has been detached by maceration in water; a thick, colourless endospore remaining, composed of two thick layers containing protoplasm, with two unequal vacuities. The fecundating tube may be seen still fixed in the endospore at U. These oospores, or resting spores, of the chickweed parasite, like those of the potato, possess the singular property of remaining dormant during the winter, and germinating (under favourable circumstances) during the following season.

We have now glanced at the fungus and its effect upon the foliage and stem; but we are all of necessity most interested in its fatal effects upon the potato itself. In the vast majority of instances the fungus makes its *first* wholesale attack upon the *leaves*, sending its destructive mycelial threads down the leaf-stalks into the stem, and thence, and lastly, into the potato itself. If this takes place when the potato-plants are young, growth is at once

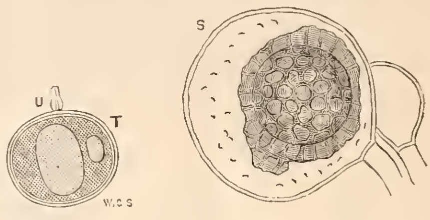

Fig. 159. *Peronospora alsineraum*, enlarged 400 diameters.

arrested; but if the plants are well established, the tubers are found to be discoloured. This is undoubtedly caused by the presence of the fungus beneath the cuticle of the potato; for if the potatoes are taken up and kept in a damp air for a day or so, the perfect parasite presents itself upon the surface. From the exterior of the potato the fungus penetrates to the interior, decomposing the tissues, and making the tuber a suitable nidus for various other fungi, which are not long in making their appearance. With the decomposition comes the disgusting odour so well known in connection with diseased potatoes; the diseased tuber is now attacked by insects, and its end is one horrible fœtid mass. It generally happens that the eyes are the last to succumb to the disease; and it is stated, that if these are cut out and planted, they grow into healthy plants; but if the fact is taken into consideration of the resting spores being produced within the intercellular passages of spent potatoes, and that these resting spores are capable of lying dormant during a whole season, it seems reasonable to imagine that the planting of such eyes would be the one *certain* means of spreading the disease.

That the fungus attacks apparently healthy plants there can be no manner of doubt, the prevailing opinion now being that it is by *no means necessary* that a plant should be in ill health for a fungus to find thereon a suitable nidus. Contrary opinions have, however, long been held, and are still held on this point, many observers thinking that excessive moisture, over-cultivation (if such a thing be possible), electrical influences, or attacks of insects, first affect the health of the plant, and predispose it to succumb before the attacks of the fungus. Mr. Alfred Smee, surgeon to the Bank of England, has long held his ground upon the hypothesis that the potato is first attacked by an aphis, and so rendered a ready prey to the *Peronospora*, and says from his own observations he believes that an aphis invariably punctures the leaves before an attack of the fungus: he holds the same views with respect to the *Ascomyces* of the peach; but Berkeley and others nail their colours to the fungus, the whole fungus, and nothing but the fungus,—and not without sufficient grounds; for, amongst other reasons, the immediate allies of the potato fungus do not prey upon decaying matter; other species of fungi do, but *these do not.*

Whilst it is comparatively easy to say when and where the potato murrain was first brought prominently into notice, and what the potato disease is, it is by no means an easy matter to suggest an effectual antidote to its ravages. Dr. Hooker has recently published in the daily papers a plan devised by Professor Henslow for preserving the nutritive portions of diseased potatoes; but, from its tedious nature, it is never likely to be carried out to any extent, or made use of by the people at large. When the disease first appeared, a quarter of a century ago, it was suggested that the moment it became manifest in the leaves the whole crop should be mown down and burnt before the destructive virus reached the tubers. Now, after all this lapse of time, no better plan can be suggested; but such is the rapid growth of the fungus, that unless the haulms be destroyed *immediately* on the appearance of the parasite, it will be *too late:* if a week or less be allowed to elapse, the mycelium will be in the tubers, and all the haulms a rotten mass.

In the case of the vine disease, sulphur has been found very efficacious; but it is impossible to apply the fumes of sulphur to the potato crops. Mr. Smee has destroyed *Oidium* in his grape-house with the fumes of bisulphide of carbon; but it is not easy to see how any fumes can be applied in the open fields.

It has recently been said that it is a disgrace to science and to scientific men that no perfect remedy has yet been found for the ravages of the potato disease: the same may be said, I presume, respecting the ravages of the rinderpest, foot-and-mouth disease, and cholera itself; but I fail to see the disgrace to "scientific men." If there is any disgrace in the matter, it rests with those persons who are commercially interested in the success of our potato crops; for, although we have had the fatal disease amongst the potatoes for a quarter of a century, these gentlemen have still the stupidest possible ideas of what it is, and how to cope with it; as is abundantly proved by the melancholy balderdash recently printed in the newspapers.

12, *North Grove West, Mildmay Park, N.*

Candour forbids me to say absolutely that any fact is false because I have never been witness to such a fact.—*Gilbert White.*

ANCIENT STONE IMPLEMENTS.*

Truly a magnificent work, and one that will delight the eyes of every antiquary and geologist in Europe! It deals with one of the most interesting and important of subjects,—the antiquity of the human race, and the stages through which poor humanity passed in its struggles to the light of civilization. Before written history commenced, a vast period had elapsed, compared with which that circumscribed by legendary and historical literature is but a span. Until the last few years, all our knowledge of this epoch was most meagre; for, accepting the long-taught doctrine of the appearance of man upon the earth being merely a few thousand years, all, or nearly all, of which was included in written history, we never guessed at the marvellous story that was hidden up in our valley gravels and bone caverns. And now all this is becoming more or less clear. Such antiquaries as Nilsson, Lyell, Perthes, Tylor, Lubbock, and Evans have done for pre-historic times what was so successfully effected only a few years ago in architecture, when all the mixed jumble of archæological lore was reduced to the historic orders of "Norman," "Early English," "Perpendicular," "Decorated," &c., and it was discovered that every old church before the Reformation might easily be referred to one of these periods by its architectural characters. The Danish antiquaries, we say, did the same by ancient stone and other implements and bronzes, and thus founded the divisions of Early Stone Age (*Palæolithic*), Newer Stone Age (*Neolithic*), Age of Bronze, and Age of Iron. Although none of these is rounded off by a definite sharp line—any more than the architectural periods are—yet they are sufficiently useful for classification, and to a wonderful extent convey the actual truth concerning them.

Mr. Evans stands in the foremost rank of pre-historic workers. None has more than he helped to clear up those "dark ages" when Great Britain was, as regarded her inhabitants, for a long period in the condition that Captain Cook found the aborigines of the South-Sea Islands. His keen, almost intuitive, knowledge of ancient stone implements is well known to every collector. So indefatigable has he been that every fresh "find" has at once brought him down. He has so entered into the spirit of how these wonderful stone weapons were formed without the aid of other tools than natural pebbles or boulders, that he has made them himself with such aid, and has patiently worked with stick and sand until he, like some of his earlier and no less skilful ancestors, produced a stone hammer with a hole through for the handle! Not-

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* "The Ancient Stone Implements, Weapons, and Ornaments of Great Britain." By John Evans, F.R.S., F.S.A., &c. London: Longmans & Co. 1872.

withstanding the variety of type of the ancient weapons and ornaments, it is wonderful how those of every country resemble each other, plainly proving that the places where stone and flint implements are still in use, are, to use a geological phrase, merely "outliers" of a once universal condition. We proceed to illustrate our remarks by

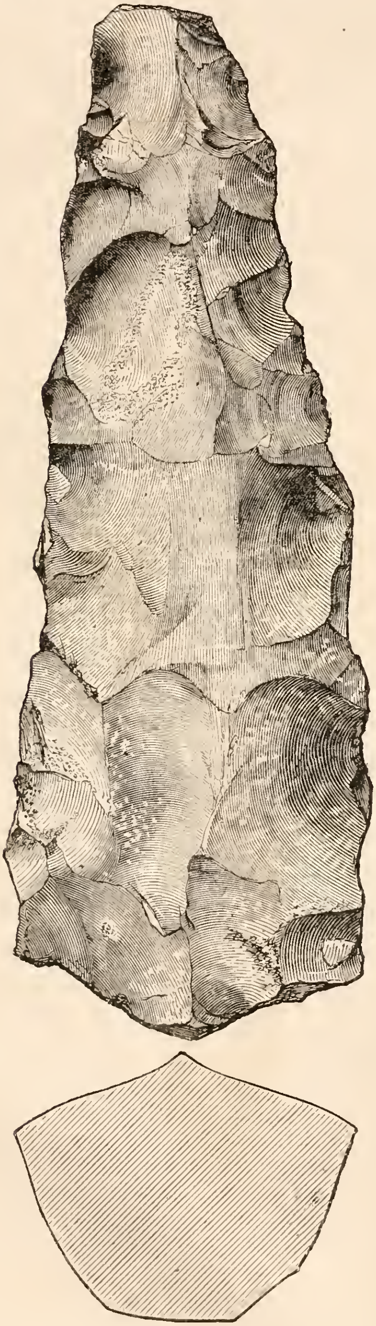


Fig. 160. Palæolithic Flint Implement, from Pressigny.

specimens, the blocks of which have been kindly lent us by the publishers for the purpose.

Fig. 160 is one of the earliest, or *Palæolithic* types of flint weapons, obtained by striking the piece longitudinally off a core. The implements obtained in our valley gravels, in the terraces above the present levels of rivers, are frequently of this shape. From this earliest and rudest of forms we have a gradual transition in the specimens to those of the latest *Neolithic* period, when their art development reached its highest finish. Fig. 161 is a

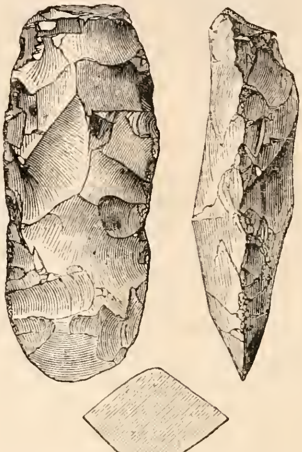


Fig. 161. Flint Implement of early Neolithic period.

specimen from Mildenhall, in Suffolk, showing general appearance, side view, and transverse section. In this it is evident that more skill has been bestowed, whilst the circumstances under which it

Fig. 162. Neolithic Implements.

was found indicate it to be of a more recent date than the preceding. Fig. 162 is from the same place, and is still more neatly finished. All these figures are drawn half-size. The broader end is ground down by rubbing to a sharpish cutting edge, the upper part remaining just as it was rudely cut

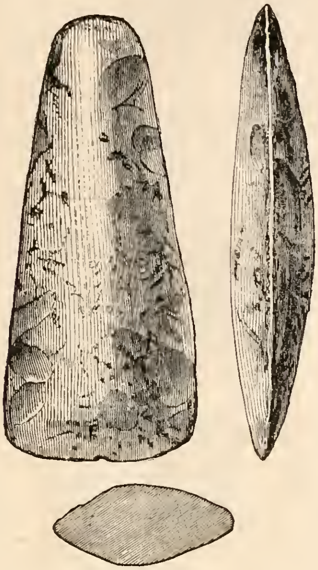


Fig. 163. Polished Stone "Celts."

out. We now come to the *polished* specimens, formerly called "Celts," of which fig. 163, from Coton, in Cambridgeshire, is a good general ex-

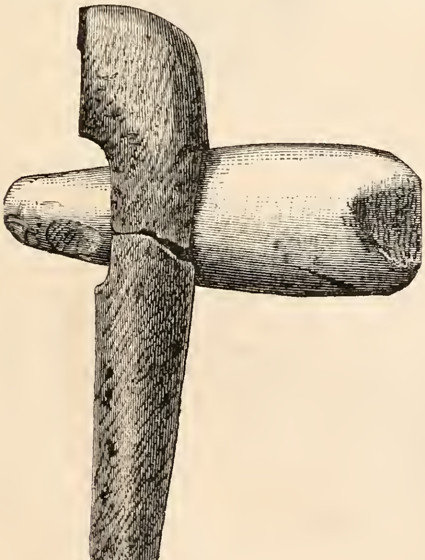


Fig. 164. Ancient Stone Implement mounted in a haft.

ample. The main difference between the *Palæolithic* and *Neolithic* (older and newer stone ages) is that the weapons of the former are true *fossils*, imbedded in such geological deposits as valley gravels and stalagmitic bone breccias; whereas the latter are often met with on the surface, or in peat-bogs or tumuli. Fig. 164 is useful, as showing the way these polished stone weapons were mounted for actual use. Singularly enough, we cannot go into any decent museum without finding recent

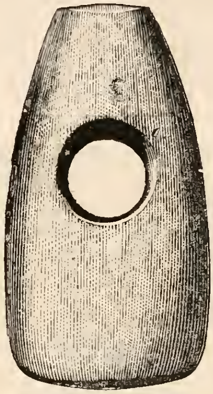


Fig. 165. Perforated Stone Hammer.

specimens of stone weapons from the South-Sea Islands mounted in a similar manner. This ancient and valuable example owes the preservation of the

Fig. 165. Flint Knife.

wooden handle to its being found in the peat which once formed the bottom of a small lake or tarn in Cumberland.

Fig. 165 affords us an illustration of quite another class of stone implements, of neolithic date, and that perhaps low down. It is a polished stone hammer, four inches in length, made of granite, and was found along with flint knives, arrow-heads, &c., at Caithness. This type of stone hammer is very prevalent in Scandinavia, and even in North America. Fig. 166 gives us an example of an ancient and useful curved knife, formed of flint, which has been chipped out with the utmost skill and care to the above form. This type is almost peculiar to Britain, although specimens have been obtained from Denmark approaching very near to it. The intellectual development—if we may use the word—which could manipulate such examples of industrial art as this and fig. 167, from so brittle an article as flint, must have been tolerably high. Both these specimens are from Yorkshire.

Fig. 167. Flint Arrow-head.

In fig. 168 we go back again to palæolithic times, as the reader will apprehend from its resemblance to the first example; for this is a good representation of the more ancient stone weapons, and is from the celebrated Kent's Cavern, near Torquay. If the ancient character of the valley gravels, with their contained implements, carries back the antiquity of the human race, the cave weapons found beneath the thick and slowly-accumulating stalagmite of the floor do even more. At the late meeting of the British Association, Messrs. Pengelly, Boyd-Dawkins, and others, expressed their opinion that, from the specimens found in Kent's Cavern and their position, man must have appeared on the earth *before* the glacial epoch! For more elaborate details as to this ancient cavern, as well as to the more modern ones of Somersetshire and the south of France, we must refer our readers to Mr. Evans's book. Fig. 169 is the portion of a flint core from Kent's Cavern, showing how the ancient knives were made by striking off flakes, exactly as may still be seen in the manufacture of gun flints in Norfolk and Suffolk.

Fig. 168. Palæolithic Flint Implement from Kent's Cavern.

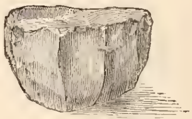


Fig. 169. Flint Core.

Space forbids us to do justice to the merits of Mr. Evans's book, which contains no fewer than five hundred woodcuts, besides plate illustrations. It is by far the fullest and most exhaustive work of its kind that has yet appeared, whilst the style in which it is written, although terse enough to show the author is in earnest, is nevertheless clear and attractive. Few books, during the present year, or for many to come, will deservedly attract more notice than that we have been endeavouring to introduce to our readers.

J. E. T.

THE "EMPEROR" MOTH.

(*Saturnia Pavonia-minor.*)

THIS beautiful insect is deservedly called the "Emperor" of moths; in fact, it occupies the same position among the *Nocturni* as the Purple Emperor (*A. Iris*) does among the *Papilionidæ*.

This moth is one of the most, perhaps *the* most, remarkable of its species in all the stages of its existence, either for its beauty or else for its peculiarity of construction.

The eggs are opaque, of a greenish-white colour, and oval in form. The outside shell or envelope is perfectly smooth and free from any sculptured forms, which are so prevalent in some of the ova of the butterflies, as, for example, in those of the small Cabbage White (*P. Rapæ*) and the small Tortoise-shell (*V. Urticæ*). The eggs are laid by the female moth in April and May, on the food-plants of the larvæ.

The *caterpillar* first appears at the end of June, and may be found from July to September. The segments are very plainly divided. In colour this caterpillar is a delicate pea-green, each segment having a broad band of black adorned with pink tubercles, each of which emits a few short hairs. It feeds upon apple, willow, and heath, and spins a brown cocoon among its food-plant in September.

This cocoon may be found all through the winter spun up among the twigs of its food-plant, or else on the ground underneath, having been broken from its support by rough weather. It is quite unique in its construction. One end is formed of very stiff hairs all converging to a point, and outside this is a loose woolly envelope or cocoon; so that while the moth, when it emerges, can easily crawl out, no other insect can get in.

The *pupa* or *chrysalis* is squat-shaped, the segments of the abdomen much divided: the wings, eyes, antennæ, and legs all very plainly marked in the outer shell.

The *moth* first emerges about the middle of April, and may be found till the end of May. The males, which fly very swiftly, are smaller than the females, but much more brightly coloured: upper wings marked with beautiful variety of blacks, browns, and reddish-browns, with an eye-like spot in each wing; under wing a rich orange-colour, marked with shades of brown and eye-spot in each wing, which the surrounding colour shows up to great advantage. The ground colour of the female is soft pearly-grey, marked with shades of black and brown, with eye-spot in each wing. The life of these moths, unfortunately, is very short, the longest I have been able to keep one alive being not more than two weeks. The females die almost directly after depositing the eggs which are to form the next generation. CLAUDE RYAN.

MICROSCOPY.

MICROSCOPIC MARVELS.—We have been favoured with the sight of some remarkable specimens of microscopic manipulation. Most of our readers are acquainted with the slides of arranged diatoms prepared by Möller. These slides are, however, not arranged diatoms, but butterfly-scales, arranged in various designs. One of the most beautiful represents two fronds of a fern, resembling a ceterach, the pinnules composed of brilliant green scales: the lower portion of the stem consists of brown scales. Hovering near are two butterflies. The body is represented by a long brown scale, the upper wings by two blue, and the lower by a pale brown scale. In another slide, the scales are arranged so as to form a group of flowers. These microscopic wonders are prepared by Mr. Dalton, jun., and we believe may be obtained through his father, Mr. R. Dalton, of Bury St. Edmunds.—*F. K.*

WOOD SECTIONS.—Those of our readers who are in the habit of mounting sections of wood have, no doubt, often been annoyed by their unsatisfactory appearance when mounted in balsam or damar. This is frequently the case, if the sections are (as they ought to be) cut very thin. The indistinctness when mounted in balsam may be avoided by dry mounting, but then their opacity renders them unavailable for use with high powers. The indistinctness of balsam-mounted specimens may be overcome by staining the sections, and for that purpose Judson's dyes will be found very useful. We have found the best effects are produced by magenta and mauve. One drop of the dye to about ten of distilled water will be found to give sufficient intensity of colour to the section. The section may be allowed to remain in the dye for several hours, and if the colour is too dark, it should be placed in spirits of wine: this will alter the tint to any degree of paleness. When the staining is complete, the section should be well washed in distilled water, and dried under pressure; then soaked in turpentine, and mounted in balsam or damar.—*F. K.*

BOTANY.

RESURRECTION PLANT.—The botanical name of this interesting plant is *Selaginella lepidophylla*, and as it is a club-moss, of course bears no flowers. It is a native of California, Mexico, and Peru, and with one or two allied lycopods, may occasionally be seen in our gardens. In a recent number of the *Gardeners' Chronicle* (August 10, 1872), there is an engraving of this singular plant, with dissections, and a description from the pen of Mr. Thomas Moore.—*W. G. S.*

LITTORELLA LACUSTRIS.—Mr. Hind records this plant (last observed growing in Middlesex in 1805) as having been gathered in July in Ruislip reservoir. He thinks that many other plants supposed to be extinct in the country are not really so, but that either they have not been noticed, or are awaiting the happy combination of circumstances requisite to their appearance.

Arabis stricta.—Mr. Barrington-Ward records the abundant growth of this rare Bristol plant on the Clifton side of the Avon, where it has been supposed extinct. He has very wisely said nothing about it until the fructification was over. It was in Leigh Woods that the plant was found so plentiful.

Commerce in Pollen.—A curious trade has recently sprung up, in a demand for pollen to fructify certain plants. The Palm tribe, the *Cycadaceæ*, and other greenhouse trees, will flourish without producing stamens, and, for want of pollen, will not fruit. It is therefore now becoming common to see advertisements for the pollen, for example, of the *Caryota urens*, and other tropical plants, and it is received through the post.

The Flora of Liverpool.—We are glad to see the really useful work which many of our leading provincial societies are achieving, in tabulating the fauna and flora of their respective neighbourhoods. The Liverpool Naturalists' Field Club has for many years taken a leading part in thus working up local subjects. The last issue of this work is a handsome volume on the flora of the neighbourhood, giving a list of the indigenous flowering plants and ferns growing within fifteen miles of the Liverpool Exchange and two miles of Southport. The latter town is brought in on account of its being a favourite resort for Liverpool botanists. The arrangement adopted in the orders, genera, and species is that of Mr. Syme, in the third edition of Sowerby's "English Botany" (London, Hardwicke). Among the chief workers we find the names of Messrs. T. B. Hall, Tudor, H. C. Watson, A. Stuart, Armistead, Slack, Shepherd, and Miss Potts. Among the plants whose loss, consequent on the extension of Liverpool, is mourned, are *Vaccinium Vitis Idæa* and *Convallaria majalis*.

Poisonous Fungi.—In view of the recent fatal accidents through eating poisonous fungi, the *Field* recommends the coloured charts of edible and poisonous species, published by Hardwicke, 192, Piccadilly, as the best precaution against the mistake so often made by people unacquainted with the distinction between them. Besides the three boys who died a few days ago at Catton, near Norwich, a family of seven people are said to have since then been poisoned in a similar manner at Mylar, near Falmouth. These charts should be exhibited in school-rooms or other places of resort.

ZOOLOGY.

Coluber Austriacus (*ante*, p. 208).—The following extract from "The New Forest," by J. R. Wise (p. 259, note), may interest Canon Kingsley and others of your readers:—"I must not forget to mention *Coronella lævis* (Boie), which is found in the Forest, as also in Dorsetshire and Kent. This is the *Coronella austriaca* of Laurenti, and afterwards the *Coluber lævis* of Lacipede. It might be mistaken for the common viper (*Pelias verus*), but differs in not being venomous, as also from the ringed snake (*Natrix torquata*) in having a fang at the hinder extremity of its jaws; the peculiarity of the genus *Coronella*. It feeds on lizards, which its fang enables it to hold; drinks a great deal of water; and Dr. Günther, of the British Museum, to whom I am indebted for the above information, tells me that it crawls up the furze and low bushes to lick the rain off the leaves." I am almost sure that a snake I saw, in September, 1871, in some dried-up boggy ground between Lyndhurst and Christchurch, in the New Forest, was this species.—*Fred. I. Warner.*

Books on the British Fauna, and Notes on Common Animals.—Systematic works on zoology do not always answer our expectations, either from their having been written rather by literary men than by field-naturalists, or by authors, who, though excellent zoologists, have been mostly domiciled in London. Yarrell, for instance, is deficient in his accounts of the notes of the feathered tribe, though much might have been told by description, and in some cases still more, as in the case of the Yellow Bunting or the Willow Wren, by the usual musical notes and signs. He says little of the characteristic notes of the different species of the Thrush tribe. There is also a good deal relating to our British Mammalia not to be found in Mr. Bell's otherwise interesting book. Two or three years back we came across a strange variety of the common Shrew. It was perfectly naked, excepting a few hairs on the tail; it appeared quite free from cutaneous or other disease, but, like its kindred in general, was intolerant of fasting; for when it had remained about eight hours in a botany-box I found it dead. The common wild rabbit, when it burrows in fields or gardens, and gives birth to young ones, takes care in the daytime to stop up the mouth of the burrow by scratching the soil or sand over it, to be opened again at night for its entry. Bell, in his description of the larger sheep—or drover's—dog, does not notice that the iris of its eye shows the same tendency as the dappled skin, having a deficiency of pigment in places, so as to give it a wall-eyed appearance. Again, squirrels have a wonderful power of attracting their fellows from a distance, perhaps explicable from their shrill voice and acute hearing. Besides the food mentioned by Bell, they eat the seeds of the fir and also fungi. I think the Dormouse gnaws the kernels of the laurel-berries, but seldom finishes one. There appear to be varieties of several of our British quadrupeds, suggestive of further examination—of the Badger, Otter, and land and water Vole for instance, the last case, however, well remarked upon by Bell. The dark variety (Water-vole) is found in the upper Dove. This little creature is not altogether aquatic in its habits; last week, for instance, in excavating an ancient barrow on the summit of a hill, at the least a mile from any brook or pool, we turned up, as usual in such diggings, quantities of its bones; the peculiar molar teeth of this little beaver-like animal being quite unmistakable. *Vice versâ*, the common Rat is often a frequenter of water, and to it the heaps of shells seen on the margin of pools and rivers are due. The Hedgehog, as well known, is protected by its power of rolling itself up and presenting its spines towards an enemy; but Bell does not advert (perhaps out of consideration for the animal) to the common but heartless device of placing it in water, when it must either drown or unroll itself. Lastly, there is a deficiency in zoological books in respect to *habitat:* to go no great distance for examples, it will be found that Ireland, the Isle of Man, and Cornwall, present many interesting peculiarities with respect to zoological distribution not generally noted.—*R. G.*

The Naples Aquarium.—On the narrow strip of coast which separates the park of the Villa Reale from the sea, a large stone building is at present being erected at Naples, quietly and almost unnoticed. The strength of the foundations—it has taken three months to lay them—shows that they are intended for an edifice of considerable size and durability; and on making inquiries I have learnt that this is the Zoological Station, which has been occasionally mentioned by Italian, German, and English journals during the last few months. It has been organized and is being built by a young German naturalist, Dr. Anton Dohrn, of Stettin, who has paid nearly the whole of the expenses, which amount to about 50,000 thalers (£7,500), out of his own pocket, the only assistance he has received having come from a few personal friends, who have lent several thousand thalers for the purpose. The following is a short sketch of his plan:—The ground floor of the building, which covers an area of almost 8,000 square feet, contains a great aquarium, which will be opened to the public. Dr. Dohrn hopes that the money thus obtained will not only suffice for all the expenses of the aquarium, but also afford a surplus to be employed in covering a part of the requirements of the upper story, which is to be exclusively devoted to scientific purposes. Besides the officials and servants employed in the aquarium several young zoologists will be attached to the Station, and receive a regular salary from the director, Dr. Dohrn. Thus, a number of new positions will be opened up for young scientific men. But this is not all. As the only duty of these zoologists will be to devote themselves to certain branches of scientific work, and their exertions will be carefully directed and organized, as has long been the case in astronomical and meteorological observatories, there is every reason to hope that scientific research will be greatly facilitated and advanced by their labours. In the upper story of the Zoological Station laboratories will also be prepared for the use of naturalists coming from other parts of Italy and from abroad. For this purpose a large scientific library will be founded, Dr. Dohrn's very considerable private collection serving as a nucleus, and about twelve tables, fully furnished with the necessary appurtenances, established. Each of the latter will be provided with a number of tanks supplied with a constant stream of sea-water. Sea-fishing and dredging will be conducted on an extensive scale by means of several boats, to which, if the necessary means are forthcoming, a small steam-yacht will be added. The animals taken will be given to the zoologist for scientific treatment. It is more than doubtful whether all these rich and expensive conveniences can be furnished to zoological visitors without any pecuniary compensation; but I hear that Dr. Dohrn has drawn up a plan which will enable even naturalists of limited means to enjoy the advantages of the Station. He proposes to offer one or more tables to various Governments and scientific societies for a fixed annual sum. These tables, and all the scientific resources of the Station, will at once be placed at the disposal of any naturalist who brings a certificate from the Government, university, or scientific body to which the table has been let. This plan, among its many other advantages, seems to be a successful attempt to solve the difficult question as to how it is possible to unite a complete self-administration on the part of scientific bodies with the reception of pecuniary assistance from their Governments. Dr. Dohrn speaks in the most grateful manner of the assistance rendered him by the German authorities in Italy, especially by Mr. Stolte, the consul-general at Naples, while at the same time he warmly acknowledges the interest in his undertaking displayed by the Government of Italy, more particularly Signor Correnti and Signor Sella, the late and the present Ministers of Public Instruction. The difficulties in the way of the execution of his plan were neither few nor small, as may be gathered from the fact that, in spite of the readiness displayed by the municipal authorities of Naples, more than two years elapsed before a definitive contract could be concluded between the town and Dr. Dohrn with respect to the cession of a suitable site for the building.—*E. R. L.*

The British Association Meeting at Brighton.—As was expected, the Association meeting this year was quite a success, not only in point of numbers, but especially in that freedom of intercourse which such meetings bring about, and which is even more valuable to the cause of science than elaborate addresses. But there were not lacking the latter, and Dr. Carpenter's as well as Professor Clifford's discourses on the nature and aim of scientific research cannot fail to produce a more humble spirit of inquiry, and less of rash speculation. The success of this year's gathering was mainly due to the efforts of the local scientific men: the Brighton Natural History Society came to the front better than we have seen any local society for many years. At each of the two conversazioni about seventy microscopes were worked by the members, every variety of object being exhibited. A new feature was the collection of living Sussex flowering-plants, which were arranged in troughs of wet sand, and neatly labelled. A first-rate herbarium occupied one entire room, and here were Mr. Mitten's splendid collection of mosses, and one of lichens no less valuable. Where all worked so well, it would seem invidious to mention particular gentlemen; but we should lack a sense of duty if we did not compliment Dr. Griffiths, Mr. Wonfor, Mr. G. Scott, Mr. C. Smith, and Mr. Howell on their successful endeavours to aid all inquirers. The temporary Museum was another important feature, as our readers will understand when we mention that Mr. Davidson's series of cretaceous Brachiopoda was here exhibited, as well as Mr. Willett's magnificent collection of Sussex Chalk fossils. As to the excursions, the remembrance of them will last for many a day, of hammering out *Iguanodon's* teeth at Cuckfield, or exploring the *Cyrena* beds at the Wealden Boring at Netherton. To speak of the papers that were read is here needless, as the limits of space even would forbid us turning our columns into a catalogue.

Preserving Larvæ.—Having tried various ways of preserving lepidopterous larvæ, such as blowing them up with air and heating them in a glass tube or metal chamber, or filling them with sand and drying them,—these methods having failed, I tried another plan, which does admirably; the only things required being a small glass syringe (which may be purchased at any glassblower's for a penny or twopence—it must be very narrow at the point) and Young's paraffin or white wax. I disembowel the caterpillar by piercing it in the anus and squeezing out the contents, drying it afterwards with rolls of blotting-paper; then I boil a little of Young's paraffin or wax, and a small potful of water. When I have the water, caterpillar, and wax ready, I draw into the syringe some boiling water (the object of this is to heat the glass so as not to let the paraffin get hard before being injected out); I then inject out the water, and draw up the wax or paraffin, dipping the point of the syringe into the boiling water. It is best to keep the water in the same vessel as it was boiled in, as it keeps warm longer. I then put the point of the syringe into the anus of the caterpillar and inject the wax into it. All these things must be done very quickly. If, afterwards, it is seen that any of the parts are not fully developed, all that is required is to pass a thread through the underside of the anal segment, dip it into boiling water for a few minutes, which causes the wax to melt, filling the different parts. The larvæ can afterwards be mounted to suit the owner, either on wires or slips of Bristol board.—*James J. King.*

Mimicry in Insects.—An instance of what might be termed mimicry, may be noticed in the common garden Carpet-moth (*Melanippe fluctuata*). It usually seeks refuge, in the daytime, in some obscure place, and there rests with its upper wings somewhat outspread, but not, as it is commonly placed, with its under wings exposed, in the entomological drawer. In its natural position, and resting on a brownish or obscure surface, it would not, from the markings on its wings, be taken for what it is, but for a smaller whitish moth, and reversed in position. If we attempt to catch it, the moth darts in the opposite direction to what we expect, and we are probably foiled. We do not affirm that this is anything more than an accidental disposition of the colours, nor are we certain that it is in any degree favourable to the preservation of the insects.—*R. G.*

New British Burnets.—Though we have announced, year by year, the addition of various moths to our list, it is very seldom that we acquire a new species belonging to the Hawk-moth tribe—the *Sphingina* of Linnæus and the older authors. Last year, however, on the side of a hill at Braemar, at an elevation of 2,500 feet, a number of specimens were taken of *Zygæna exulans;* the Scotch examples of this continental species presenting some local peculiarities. And this summer, in that choice spot for insect-hunting, the New Forest, several collectors have caught examples of *Z. meliloti,* but slightly damaged, as they were too late for the species. Both seem to be limited in their range; the latter, though smaller, much resembles *trifolii;* the new Scotch Burnet is decidedly unlike the long-known British species.—*J. R. S. C.*

The Camberwell Beauty (*Vanessa Antiopa*).—We have been overwhelmed with notices of the abundant appearance of this beautiful object, in various parts of the country. The question for entomologists to consider is whether they have been British bred and born, or continental specimens on a visit. The peculiar cream tinge of the border would seem to indicate the latter.

Mimicry in the Snake.—Professor Cope makes the following remarks:—"I had for some time a specimen of *Cyclophis æstivus* living in a Wardian case. The slender form of this snake, and its beautiful green and yellow colours, have led to the opinion that it is of arboreal or bush-loving habits. It never exhibited such in confinement, however, and instead of climbing over the caladia, ferns, &c., it lived mostly under-ground. It had a curious habit of projecting its head and two inches of its body above the ground, and holding them rigidly in a fixed attitude. In this position it resembled very closely a sprout or shoot of some green succulent plant, and might readily be mistaken for such by small animals."

A New Zoophyte.—Dr. J. E. Gray has described a new genus of Escharidæ from Natal, under the name of *Flustramorpha*. It includes two species, *marginata* and *flabellaris*.

New Fishes.—Dr. Günther has also described two new fishes from Tasmania. One genus is new, and allied to the Percoids, called *Lanioperca mordax*. It goes by the name of "Pike" and "Jack" among the colonists. The other species is *Chilodactylus Allporti*, named after Mr. Morton Allport, in whose collection both were found.

GEOLOGY.

The Doward Caves.—The Cotteswold Naturalists' Field Club had an interesting excursion to these caves on the 19th of August. Their bone breccia has been carefully worked by the Rev. W. S. Symonds, F.G.S., who was with the party, and he, as well as Dr. Wright, the Vice-President, gave a most interesting description of their contents. In one cave, called "Bannerman's Cave," remains of the Cave Lion, Rhinoceros, Mammoth, Irish Elk, Reindeer, and Horse were disentombed. In "King Arthur's Cave" were the bones of the long-faced Cow (*Bos longifrons*), as well as those of the Marmot, Beaver, Badger, Wolf, Otter, &c. A layer of stalagmite was found beneath these deposits, and lower still was another bed, in which remains of the Cave Lion, Cave Bear, Cave Hyæna, Rhinoceros, Elephant, Reindeer, Irish Elk, &c., were met with. In the same stratum flint flakes were also found, although no remains of man. The latter cave is 285 feet, and the former 350 feet, above the river Wye.

Gigantic Flying Lizards.—The extensive collection of fossil remains recently made during an expedition to the western parts of the United States are now yielding, in the hands of Professor Marsh, very interesting results. Five specimens of the new species, among the largest known, of *Pterodactylus occidentalis*, were found. This belonged to the short-tailed group, and its spread of wing must have been from eighteen to twenty feet, whilst its large teeth clearly indicate its carnivorous habits. Another species, *P. ingens*, exceeded this in size, having an expanse of wing of at least twenty-two feet. These are the first remains of flying reptiles found in America.

Cretaceous Birds.—Professor Marsh has recently published a very elaborate memoir on the large fossil bird named *Hesperornis regalis*, which was a large swimming bird, having its nearest allies in the *Colymbidæ*, but differing in many respects from them, and indeed from all known birds. Three other species of fossil birds, allied to the Cormorants, and named *Graculavus*, have also been discovered in the cretaceous Green-sand of New Jersey, United States. The species are relatively *velox*, *pumilus*, and *anceps*. The same beds have yielded the remains of a new cretaceous wading bird, called *Palæotringa vagans*.

New Cretaceous Reptiles.—The same geologist has also discovered, among the rich collection in the Yale Museum, several new reptilian forms, of Cretaceous age, belonging to the *Mososaurus* group. Two new genera have been established, and named *Lestosaurus* and *Rhinosaurus*, under the former of which no fewer than four new species have been included. Professor Marsh shows that the necks of all the reptiles of the Mososaurus family were very short.

Model of the Wealden.—During the meeting of the British Association, considerable interest was manifested in the Geological section by a geological model of the south-east of England and part of France, including the whole of the Wealden area. It was constructed by Mr. James B. Jordan, of the *Mining Record* office, from data supplied by Mr. W. Topley, F.G.S., of the Geological Survey. The model is one of the most beautiful we have ever seen, and we are glad to find it is about to be published, the constructor allowing a considerable discount to members of the British Association.

NOTES AND QUERIES.

Swallows and Martins in 1872 (p. 189).—I fancy that "E. M. P." is partly right in his conjecture. Swallows are decidedly scarce, if not altogether lacking, in many localities near London. On the theory still advocated by some as to their hybernation under water, it might be supposed that during the wet winter of 1871-72, the birds got too much water through the floods which were out in various districts, and were so completely submerged that they could not extricate themselves. I have not, however, noticed that martins were below the average in point of numbers; indeed, in Kent, about Gravesend, they were very conspicuous on the wing in May and June. On one occasion, a luckless individual entered a Gravesend church just before service, and, in spite of all efforts to bring him down by means of umbrellas, coats, &c.

continued to gyrate hither and thither until the congregation dispersed, in some of his evolutions approaching very near to the minister officiating.—*J. R. S. C.*

Chaffinch's Nest.—One evening in July last I took a chaffinch's nest with five eggs: it was built in a holly-tree about six feet from the ground. Its singular appearance first attracted my attention, as it afterwards proved, by its containing a nest of the common humble bee. Is this not rather an unusual occurrence, as that insect generally builds in banks, &c.?—*Thomas C. Oborn.*

Bee Orchis.—I found a single plant of this rare orchid last season, growing close to the steep pathway which leads down to the great quarry at Babbacombe, and although I sought diligently all round that district for some weeks afterwards, I saw no more of it. My much-prized little waif had but a solitary bloom on the tip of its spike, and was, indeed, but a stunted plant, although the flower itself was of the ordinary size and very brilliant in colour. This season, however, I have been very fortunate in finding this lovely species in tolerable abundance and of considerable size, some of the spikes being over eight inches in height, and bearing a series of exquisite blooms, from five to eight in number. They were growing in society with very fine specimens of the common crimson and pink orchis, on the downs between Churston and Brixham, perilously near the ordinary pathway; but as these downs are, I believe, very little frequented, I am in hopes that this rare orchid will escape detection by the numerous ruthless collectors of rare plants that infest this and many other parts of Devonshire, much to the annoyance of all true lovers of botany.—*W. H. Grattann, Torquay.*

Cry of Woodpigeon.—With regard to G. O. Howell's communication respecting the Woodpigeon's cry, I may say that I heard the story he relates more than ten years ago, told by a farmer in Essex, with some very small differences of detail. I at once set it down as belonging to the vast genera of tales that may go for as much as they are worth, for it is very unlikely that any one living in such a place as Wales, or indeed in any place at all, should be ignorant of the cooing of the Woodpigeon.—*J. H. Jennings.*

Origin of the Game Cock.—"J. W. B." was misinformed when he was told that the Game Cock is a hybrid "between the cock pheasant and the farm-yard hen." The exact origin of the Game fowl, like that of most of our other domestic animals, is hidden in the obscurity of the past. However, most of the naturalists who have studied the subject think that the Game fowl, like all our other domestic varieties of poultry, is descended from the common jungle-fowl (*Gallus ferrugineus*). "J. W. B." is also mistaken when he states that they are "now happily scarce." A visit to any of our large poultry-shows will convince him that they are as numerous as ever; and indeed it would be a great pity if the breed were neglected, as, although rather small, they are the best of all fowl for the table; the hens are good layers and excellent mothers; while for brilliancy and beauty of plumage, they are unsurpassed by any other variety.—*W. M. A. W., Dalkey.*

Dead Flies.—Walking one evening in Burghley Park, with an eye to the collection of specimens for the microscope, my attention was attracted to a clump of grass under the shade of some spreading lime-trees. On many of the stems of grass were insects like the one I inclose (my entomological knowledge is insufficient to enable me to give its scientific name): their legs were so firmly entwined round the grass, that it was next to impossible to remove them without pulling them to pieces. To my surprise I found that all the insects were dead; and on closer examination with a lens, they appeared to have been affected by the fly-disease—*Empusa muscæ.* Many of the stems of grass had two insects upon each; and it was curious to see so large a number affected in the manner described.—*J. Ford, Stamford.*

The Influence of a Damp Winter on Insect Life (p. 139).—I would remark, in reply to "C. G. B.," that I never intended to dissociate the influences of moisture and a high temperature in winter; the two are almost invariably connected, and it is to the operation of both causes that I attribute the scarcity of insects generally in a season like the present; indeed, his remarks on the impetus given to the operations of birds and predacious insects by a mild winter tend to support my views. In speaking of hybernating larvæ (of the *Lepidoptera*), "C. G. B." scarcely distinguishes sufficiently between those whose habit it is to remain without food during the winter, and those which eat a little at intervals, feeding as they do upon plants which are more or less in leaf during the winter. The result of a mild winter in the latter case is, that though some fall a prey to various enemies, the rest of the brood are only stimulated to a more rapid growth, and therefore feed up and become mature earlier than usual in the spring. The larvæ, which should naturally be torpid, suffer most by the mildness, because, as I stated, they will, some of them, be roused to activity when there is little or no food for them. Many of these repose during the winter on or near the ground, and are killed by excessive moisture, but unhurt by frost. In a late number of the *Entomologist* there appears a note from a well-known correspondent on this very subject, and I am glad to be able to quote Mr. Reeks's opinion that a bad summer for insects is sure to follow a winter such as that of 1871-72. He states: "I have for many years noted that mild, wet winters prove far more destructive to insect life than dry ones with any amount of severe frosts;" and the sudden alternations which we have had this summer have helped to increase the scarcity of butterflies and moths. A favourable day would bring forth a great portion of a brood from the pupa; but ere the work of oviposition was completed, a change would come, and winds or rains sweep many of the insects away, leaving few to continue the species.—*J. R. S. C.*

Erratum.—In the note on Montagu's Harrier in August number, read 1870 for 1872.

The Leopard Moth.—In his "British Moths," Newman states that the wood-boring larva of this insect never destroys the trees in which it makes its habitation, but rather improves them. Of course it behoves one to be very careful before questioning the accuracy of so decided an assertion made by so eminent an entomologist; but not far from this place there is a row of elms, several of which have been entirely destroyed by *Z. æsculi.* The trees were carefully and constantly examined by myself and other collectors during this year's season, and many Leopard moths were taken, but no traces of beetles or other insects were observed. Some idea of the ravages committed by these moths may be gained when I say that on two elms standing close together, I observed, at one time, upwards of twenty specimens of the perfect insect.—*E. C. Lefroy, Blackheath.*

The Colours of Lepidoptera.—I read with much interest the article on this subject by Mr. J. Anderson (p. 175), and I was especially struck by his remark on the metallic lustre which some butterflies have on their wings. He says, that no doubt this is owing to scales of different shades being placed transversely, like the threads in shot silks. I should be very much obliged if he, or any other correspondent, would say if this is correct, and if not, what is the true cause of this brilliant appearance?—*E. C. Lefroy.*

How to Clear a Pond.—I shall be much obliged if any one can tell me how to get a small pond clear. It is nowhere more than eighteen inches deep, the water is not at all muddy, and the fish are quite healthy. The thickness is solely owing to microscopic vegetation. Can any one tell me how to get rid of it?—*H. B. Rutt.*

Fecundity of the Hydra vulgaris.—The two Hydras referred to in the end of my remarks on them, in last June's number of Science-Gossip, p. 135, as having been cut into several pieces, and restored to perfect animals, when cut (on March 29th), I placed in a wine-glass of clean water, that I might be able to watch, and observe the progress they made from time to time, at the same time keeping them supplied with water-fleas (*Daphnea Pulex*), which are to be found very plentiful in many ponds. The Hydra takes them very readily; it is amusing to see them seize the Daphnea with their tentacula and absorb them, sometimes three or four at a time. The carapace or shell of the Daphnea, which the Hydra rejects, together with the dead bodies of those that die through coming in contact with the stinging power of the Hydra, sink to the bottom of the glass. To keep them clean, they can easily be removed with a dipping-tube, taking care not to take up any of the Hydras with them. Having seen how very fast they had increased by budding, after the operation of cutting, on April 29th I removed them into a larger glass; taking them out singly, and counting them, I found they had, during one month, from March 29th to April 29th, increased to the number of eighty-nine, and most of them still had young ones growing on them, some having one, others two; so that, in all probability, another week would have doubled the number. In Johnston's "History of British Zoophytes," p. 136, he remarks it "as most extraordinary that polyps produced by this process grow much larger, and are more prolific in the way of their natural increase, than those that were never cut." This I have proved. It has been said by some that the Hydra can be produced perfect from a single tentacle severed from the body; this I have never been able to witness, though I have tried the experiment.—*J. Fullagar, Canterbury.*

Section-cutting.—Mr. Walter White's arrangement of a section-cutting instrument with wedges is very ingenious, but I think a good screw would be found to answer a great deal better, besides being neater, and taking up so much less space. Perhaps many of your readers may not be aware that nuts and screws, beautifully cut, of various lengths and sizes, which are readily adapted for the purpose, can be bought very cheaply at most of the London tool-shops.—*C. T. N.*

Queen of Spain Fritillary.—It may interest some of your subscribers to know that a Queen of Spain Fritillary (*Lathonia*) was caught on the 14th ult., in the Warren, near Folkestone, by H. G. Greenish.

Rural Natural History (p. 215, 1872).—Your correspondent says that in his locality some of the same superstitious remedies for whooping-cough are in use as in Cheshire; but he has not said where that locality is. I am collecting the folk-lore of Natural History, and should be glad to know where the remedies are in vogue that your correspondent describes; and shall also be grateful for any further information on the subject from him or any other correspondent.—*Robert Holland.*

Keeping Caterpillars.—I have tried the plan of keeping caterpillars mentioned by "E. T. S.," in the August number, and I find it answers very nicely, only I cover the top of the pot with muslin tied round with string; but I am in need of help how to keep chrysalids, as some, and the Privet especially, bury themselves in the mould. Can any of your correspondents give me advice as to how I am to manage when they are ready to turn into the chrysalis state, and which is the best way of keeping them through the winter?—*Mabel Green.*

Swallows' Nests.—A nest built this summer by a pair of swallows under the eaves of a cottage, at The Maidens, Ayrshire, proved too small for the family when the eggs were hatched. This the old birds at once proceeded to remedy, by "building an addition" at one side of the nest, and opening a communication between it and the original nest; thus making what is called in Scotland "a butt and a ben."—*R. G.*

The Heracleum giganteum is a native of a much colder climate than ours. It grows wild, I am told, in Siberia, and "J. H. G." will find, if he turns to any botanical work of repute, that it belongs to the genus *Heracleum*: our Cow Parsnip is another *Heracleum*. This genus are all umbellifers, and "J. H. G." is perfectly correct. The generic name is derived from that hero of the Greek legends, Hercules. The roots and stems of some of the species are eaten in various parts of the world. The native tribes of North America and the inhabitants of the Caucasus devour them as readily as our pigs do the Cow Parsnip (*Heracleum sphondylium*).—*H. E. W.*

Pet Starlings, &c.—In answer to "G. T. J." in last month's number of Science-Gossip, I beg to inform him that by using a hollow perch made by pushing out the pith of a small elder-stick, and cutting into the tube, so to make a number of notches or holes, the parasites will be found in this hollow perch, by taking it out of the cage and tapping it, whilst holding it upright, into a glass of water.—*R. Allison.*

Where are the Swallows?—With the exception of a few sultry days we have had little weather such as the swallows delight in, which probably accounts for their scarcity. There are not more than half as many swallows, &c., in Devon as there was last year, and they came very late.—*Arthur Smyth.*

Death's-head Hawk-moth (*Acherontia Atropos*).—Yesterday (September 1st), whilst in the country, I met with a fine caterpillar of the Death's-head moth (*A. Atropos*), which was full-fed. It changed to a chrysalis—*above the ground*—this morning. I shall feel grateful to any experienced reader of Science-Gossip for a few hints relative to the treatment of the pupa of this insect.—*Robert Laddiman.*

Green Field Cricket (*Gryllus viridissimus*).—I had, the other week, a fine specimen of this cricket brought to me, which is now alive and in good condition. I give it small flies, caterpillars, &c., and a piece of bread occasionally, which it readily devours. It is getting perfectly tame, and will take its food from my hand without exhibiting the least fear. Not having a place of reception in readiness for it when brought me, I placed it, *pro tem.*, in my breeding-cage with the other insects, larvæ, &c.; but I was obliged to remove it, or it would have made sad havoc amongst them, which would, I doubt not, have ended in the annihilation of the greater part of my larvæ. The first thing it did on entering was to seize a caterpillar of *V. urticæ* (hanging by its tail, preparatory to changing to the pupa state), which was soon completely devoured. Not approving of this sort of conduct, I at once put him into a box by himself, but I have heard very little singing from him; I hope to be able to keep him throughout the winter. It is very interesting to watch the manœuvres of this insect.—*Robert Laddiman.*

Mice entering Cages.—I, like "J. R. S. C." and one or two other correspondents to your valuable periodical, have been annoyed by mice entering the cage, in this instance of a canary, which was suspended by a chain about two feet in length from the centre of the window cornice, so that the mouse had to descend by it into the cage, and after eating some bread and seed, it had to ascend in the same way. I found that there was a mouse-hole just above the cornice, so I set a trap close to the hole in order to catch the mice. I had it there for some time; but though it did not succeed in doing so, I am glad to say I have not been annoyed by them since. I suppose the trap frightened them. I fancy the mice usually came in the night, although one was once seen during the daytime; but the lady who saw it was too frightened to notice its mode of escape. Mice were never seen in any other part of the house.—*J. T.*

Eggshell of the Large Garden Snail (*Helix aspersa*).—The eggshell of this snail, when properly prepared, is a highly beautiful microscopic object, viewed with a high power; it is, however, somewhat difficult to accomplish. A few years ago a gentleman of high standing in microscopy excited my curiosity by telling me the shell was composed of two membranes, between which innumerable crystals were inclosed that in process of time adhered to each other, and thus constituted the solid shell of the snail. From that time until about a fortnight ago I have availed myself of every opportunity to witness this curious process, but without success; and a circumstance I witnessed, at the time I have named, demonstrated that mortal eye had never seen it, and never will. The circumstance I refer to was seeing a young snail emerge from the egg, within which he had built his house, shrouded, meanwhile, from sight by the jewelled robe in which he had been rearing the structure, and which he contemptuously threw aside for the use af ony one who might value his old clothes. As the young snail (about the size of a large pin's head) crawled, the pulsations of his heart could be seen beating time at the rate of seventy-six beats in a minute. My friend was in error also in regard to "two" membranes; there are several in one case. I succeeded in separating seven layers. The inner one is always as transparent as glass; every one of the others is strewed, more or less closely, with beautiful crystals of carbonate of lime, and it is when thus divided the crystals show to most advantage; and although all are cubical in structure, they present a variety of forms, according to the angle presented to the eye by the individual crystal. I may add that I have found the separation of the layers easiest when the egg was newly deposited. The crystals were too numerous for counting; but I estimate them at about 150,000 in each egg.—*A. Nicholson.*

Dock *v.* Nettle.—There is a wide-spread belief among country children that the smart caused by the sting of a nettle may be removed by beating the injured part with a dock-leaf, the juice which exudes from the bruised leaf being apparently the soothing medium. Can any of your readers inform me whether the relief afforded is real? I am rather inclined to think it is, for I have often felt the sting of a nettled hand for a day or two under ordinary circumstances, especially when washing it; but rubbing the stung part with a bruised dock-leaf has stopped the smarting in a few minutes. The children when beating the stings, to complete what they regard as a sort of charm, keep singing "Nettle go out, and dock go in!"—*G. H. H.*

Bees.—I, like Mr. Graham, lost several of my bees, and let the boxes (three in number) remain. During the month of June I filled two of the boxes with bees—the other still remained half filled with empty comb. On July the 22nd a labourer living more than half a mile from me had a stock swarm, and put them in a hive. The following day they left the hive, and were seen flying straight towards my aviary, where they went into my box, and are doing well. Strange they should go so far, as they passed an aviary before coming to mine. It would appear the bees send scouts to find a new home before leaving the old one.—*Arthur Smyth.*

Clothes Moths.—The following may, in some degree, be of advantage to those whose wardrobes, &c., are infested with those troublesome insects, "moths." Take nicely matured horse-chestnuts, in proportion to the dimensions of the place infested, and scatter them on the bottom of the drawer or amongst the articles to be preserved. This will be found effectual, and is not recommended from mere hearsay, but from many years' experience. The "chestnuts" must be changed when they become dry, which will be in six or nine months, according to the temperature of the surrounding atmosphere. The foregoing is simple, free from danger, is not so disagreeable as turpentine, or so dangerous as benzole.—*P. S. Warrington.*

Hedgehogs and Chickens.—I recently had a brood of eleven chickens of spangled Hamburgs, and they did well for a fortnight; but, a few days ago, five of them were found dead, with only their heads bruised and eaten. We supposed the destruction was caused by a cat, until, three or four evenings since, my terriers kept up such a barking that I went with a lantern to see the cause, and found a hedgehog. To release the poor beast I took the dogs away, and put the hedgehog over the fence into a meadow, where, I suppose, it came from, and got through the fence into my garden, where the hen was sitting, and as we had afterwards taken her indoors every night, yet it was found by the dogs within three yards of where the mischief was done. Can any of your readers inform me if this same animal was likely to have been the transgressor? It is curious, about three years ago I brought a hedgehog and set it loose in the garden, thinking he would destroy the slugs, &c., and we never saw him after.—*W. H. M'Lachlan.*

Swallows.—In reply to the inquiry of "E. M. P.," regarding the departure of swallows, it must be borne in mind that the representatives of this tribe are very "sensitive," if I may use the word; perhaps more so than any others. Should they, perchance, have suffered any injury from the collecting ornithologist, or had their nests robbed of the eggs by the egg-fancier, they will not only desert the spot itself, but their favourite haunts for miles around will become desolate. On the borders of Lancashire and Cheshire they are very numerous; in fact, they are more numerous this year than I have ever known them to be before. This may, indeed, account, to a certain degree, for their scarcity in the south-eastern part of the country.—*P. S. Warrington.*

"Where are the Swallows?"—The query put by "E. M. P." had occurred to myself before reading his remarks in Science-Gossip for August. This year I have seen very few swallows and martins (and I may add, in passing, butterflies and moths) during the usual months in which they appear. One friend has not noticed any difference in his own neighbourhood, not far from this (North Staffordshire). But others, with myself, have fancied that these annual visitants have been fewer than usual this year. Have other observers noticed this? "A. H.," in this month's number (September), observes that they have been seen in considerable numbers south of the Thames, and in localities where they have not before been noticed. Is this an isolated case? If not, will it answer and explain our inquiry?—*J. S. B.*

Do many Swallows perish in their Migrations?—This inquiry is suggested by a remark in one of Professor Kingsley's sermons, to the following effect:—Thousands died in their passage south. Thousands more died in their passage back again this spring, by hunger and by storm." Is it an ascertained fact that *so many* birds of passage perish in their migrations?—*J. S. B.*

Coluber Austriacus.—Will some reader kindly tell me what the *Coluber Austriacus*, mentioned in the last two numbers of Science Gossip, is? I have *Bell's British Reptiles*, and find no account of it, unless it be the snake mentioned as having been taken near Dumfries, by Mr. J. W. Simmons, supposed to be unique, and here called *Coluber Dumfrisiensis.*—*W. G.*

Preserving Fungi.—In the August number of Science-Gossip, "S. T. T." gives a receipt for preserving fungi, in which a mixture containing *sulphuric acid* is to be filtered through *chalk* or *lime.* I hope no one has tried the experiment, as the boiling over and mess would be very annoying if chalk were selected. If lime be used, the sulphuric acid would simply be removed from the mixture by converting the lime into a sulphate (gypsum).—*W. G.*

The Camberwell Beauty.—It may possibly be worth putting on record that on Monday last, Sept. 2nd, my sons captured a specimen of the Camberwell Beauty (*Vanessa Antiopa*), while fishing in the park of my friend, Lady Shelley, at Maresfield, in Sussex. I know that this species has been chronicled as a visitor at Lewes and Worthing, in this county; but, as far as I can gather, from the works to which I have access, this is its first appearance upon our weald clay.—*W. N., Forest Lodge, Maresfield.*

The Smooth Snake (*Coluber Austriacus*).—The first example of this snake is said to have been taken near Dumfries, and hence named *Coluber Dumfrisiensis.* Several more instances are on record, and now it seems to have again turned up. In the *Zoologist* for June, it is said to have been taken on a heath near Bournemouth (which would seem to be its favourite locality), and again, in the same magazine for July, a gentleman mentions having taken it on Bournemouth heath last summer. He also says that a friend showed him two small ones in a bottle, both taken near the same locality. It is to be hoped that the search made for it will not exterminate the species.—*W.T.P.W.*

Bees' and Wasps' Nests.—There are two interesting facts, having reference to the above, which have come under my observation, and I should like to lay them before the readers of your valuable journal. Several years ago I habitually destroyed all the nests of humble bees and wasps that I discovered, and have on several occasions observed some interesting details in regard to these insects. I once found the nest of a garden bee (*Bombus muscorum*), and it was, as usual, constituted of decayed grass, and presented, in every respect, the same appearance as that of the nest of the field mouse. It was situated in the long grass of a bank adjoining a field, and soon after its discovery I turned the grass aside with a walking-stick and revealed the nest. I then removed a portion of the dried grass which inclosed the comb, and discovered that two slow-worms (*Anguis fragilis*) were comfortably resting there. On being disturbed, they immediately retreated into the hedge, and I saw no more of them. There was some honey in the comb, and I was astonished that the bees, being numerous, had not caused the removal of the slow-worms previously to my having done so. On another occasion I discovered a nest of the common humble bee (*Bombus terrestris*) in the same hole as that of a wasp's (*Vespa vulgaris*). The season was about the middle of summer, and the nests were situated in the midst of a bush adjacent to a stream. The wasps, in reaching their own habitation, had to actually pass over the nest of the humble bees. The comb of the wasps was situated a few inches deeper in the ground than that of the bees, and it was a very small nest indeed, there being not more than about twelve wasps, and the amount of comb was very insignificant. The bees' nest was a strong one in point of numbers; but whether the fact of the wasps' nest being so small was owing to the destroying propensities of the bees or to the earliness of the season, could not be satisfactorily determined. Probably, however, it was the latter; at any rate, there were no dead wasps found in the nest subsequent to the removal of the earth.—*William F. Denning.*

NOTICES TO CORRESPONDENTS.

J. Reeve.—The variety of Daisy sent is that known as *proliferous*. It is figured in Science-Gossip for 1865, page 182.

E. Ward.—We are most willing to oblige you in your difficulty, but nothing was said about naming the insects.

T. W.—We are sorry we cannot comply with your request, as we are obliged to adhere to our rule of not answering anonymous queries or communications.

W. L. W. E.—Your box and note arrived, but the Lycosa was *non est inventus*.

T. R.—Your specimen is an immature variety of the Bladder-fern (*Cystopteris fragilis*).

J. W. G.—Mr. Highley's paper is not to be obtained. See "Half-Hours by the Seaside." London: Hardwicke.

W. S., Jun.—The supposed fungus is a common lichen called *Cladonia*.

W. R.—Your query appeared in the August number of Science-Gossip, but has not been answered. Bird-stuffers keep the mode of cleaning feathers a professional secret.

A. E. Murray.—No duck-weeds were enclosed in your communication. Please send your proposed sketch to us.

E. T. S.—Your Hawthorn bushes have been the usual White Hawthorn, with grafts of the pink variety. The natural shoots ought to have been cut away as they started, but they have been allowed to grow, and the foreign grafts are either smothered or starved. Graft again, and watch better.—*J. C.*

I. W.—Mosses: 1. *Bryum capillare*; 2. *Grimmia apocarpa*; 3. *Orthotrichum saxatile*.—*R. B.*

C. P.—The "nest" is composed of the cocoons of a colony of small Ichneumons, probably of the genus Microgaster. The larvæ, after feeding within the body of some unfortunate moth larva, and destroying it, spun up side by side upon the blade of grass, and produced the small flies.

A. Smyth.—The specimen is not a grass, but a rush, called Wood-rush (*Luzula campestris*).

H. Corrie.—A rush (*Juncus glaucus*).

A. A.—The plant is *Alisma natans*.

F. W.—Please send other specimens.

S. A. B.—1. The specimen sent is the Bird's-nest Moss (*Nidularia*). 2. It is not our rule to return specimens unless they are valuable, or some special scientific interest is attached to them.

Dr. J. P. H. B.—(A bundle of mistakes in last month's answer.)—For *Barth.* read *Benth.*; *Grisebach* for *Griesbach*; and *Vernonia* for *Veronica*.

M. D. Beresford.—Owing to the balsam used for mounting being soft, the pressure of the slides on each other in transit squeezed it out between the cover and the slides, and carried the diatoms along with it. Hence we can only name one. That with the ink memorandum on it contains *Bacteriastrum varians* of Lauder, *B. univalvum* and *B. furcatum* of Thadbolt.

Chas. J. Bradbury.—The parasite on tortoise has lost its head, and so prevents its specific recognition. It is an *Ixodes*—that is all we can make out, on account of its being without its ordinary accompaniment.

J. H.—You had better apply to Professor Wyville-Thomson, Edinburgh, who is to have scientific charge of the expedition.

J. E. G.—Mosses: 1. *Hypnum striatum*; 2. *H. molluscum*; 3. *H. cupressiforme*; 4. *H. fluitans*; 5. *Neckera pumila*.—*R. B.*

E. C. L.—Your article will appear in due course.

J. H. G.—Thanks for your suggestion about a Naturalist's Calendar. It had already been considered by us, but it is too late this year. We shall see what another will bring forth.

Senex.—You will find the text of the Wild Fowl Protection Act, giving all details, and enumerating the birds, in the last number of the *Zoologist*. It is much too long even for us to give an abstract here.

Answers deferred.—M. T.—R. W.—T. G.—J. W.—E. T. S.—E. C. J., &c.

EXCHANGES.

For fragment of *Vesicularia spinosa* send stamped directed envelope to P. Smith, Legh Street, Warrington.

For *Erysiphe Martii* and *Trichobasis senecionis* send stamped envelope to Isaac Wheatley, Malling Street, Lewes. Any microscopical object acceptable.

Living specimens of the Ringed Snake (*Natrix torquata*) and of the Blindworm (*Anguis fragilis*). State what required for them.—Address, A. B. C., Post Office, Five Ways, Birmingham.

C. moschatus offered for other Coleoptera. *Longicornes* preferred.—E. C. Lefroy, 2, Granville Place, Blackheath, S.E.

For seed-pod of *Lunaria biennis* (unmounted) send stamped envelope and object to A. H. Cartwright, 1, Brickwood Villas, Croydon.

Fossil Diatomaceæ, Ebstorff, Hanover, or *Orbitolites complanatus*, both well mounted, for other slides. Names required.—H. B. Thomas, 13, Market-place, Boston.

Larva of Ant Lion, alive, in exchange for well-mounted entomological slides. Send list.—J. A. Graham, Stone Lodge, St. John's Road, New Cross.

Growing plants of *Ophioglossum vulgatum*, *Polypodium vulgare*, *Scolopendrium vulgare*, &c., for Birds' Eggs or larva of Lepidoptera.—S. L. Mosley, Almondbury Bank, Huddersfield.

For Peristomes of Moss (*Hypnum rutabulum*) send stamped and directed envelope to Jno. H. Martin, 86, Week Street, Maidstone.

Wanted Spiracles and Tracheæ mounted. Good named slides given in exchange.—E. Lovett, Holly Mount, Croydon.

Lovely Adriatic Seaweeds and Dalmatian Flowering Plants named, also Mexican and Panama, choice, for microscopic slides.—N., 20, Maryland Road, Harrow Road, W.

Eggs of Spotted Flycatcher, Sedge Warbler, Meadow Pipit, Moor-hen, Common Guillemot, in exchange for others.—C. Bankart, Narbro', near Leicester.

Silkworms' Eggs in exchange for good microscopic objects.—Address, W. Brigg, Jun., Cliff Road, Leeds, Yorkshire.

Parasites wanted, other microscopic objects in exchange.—T. W. Cowan, Horsham.

Scales of *Exocœtus volitans* on receipt of stamped directed envelope. Any object of interest acceptable.—John M. Campbell, Bruce Buildings, 6, Carrick Street, Glasgow.

Mosses from Scotland for other mosses, or for Lichens.—T. H., Highfield, Sydenham Hill, London.

Scales and pieces of skin of Ceylon Snakes for mounted objects.—A. C. Haddon, 2, Pelham Villas, New Wimbledon.

Good British Lepidoptera in exchange for a few Foreign Butterflies or Beetles.—C. R. Doward, 28, Pitmaston Road, St. John's, Worcester.

British Lepidoptera in exchange for British or Foreign, or microscopic slides.—Joseph Anderson, Jun., Alresford.

Spiracles of Privet Caterpillar, Larva of Cockchafer and Blowfly, well mounted, for other good mounted objects.—J. Ford, Stamford.

Lon. Cat. Brit. Plants, Nos. 277*, 278*, 285*b*, 776, 1061*b*, 1085*b*, 1184, 1188, &c., offered for 110, 129, 169, 289, 290, 650, 651, 1185, &c.—W. H. Beeby, 41, North End, Croydon.

One of Wheeler's 21*s*. Pocket Microscopes, 3½ inches long, ½-inch diameter. It has Huyghenian eye-piece, ½-inch French achromatic triplet, and glass stage for objects. Good field and clear definition, and magnifying power of 100 diameters. For one of Browning's Miniature 20*s*. Spectroscopes.—S. Gillson, Mountsorrel, Loughborough.

Sticta aurata offered in exchange for other Lichens.—Address, R. V. T., Withiel, Bodmin, Cornwall.

Wanted a few roots of *Ceterach officinarum* and others. Derbyshire ferns given in exchange.—Thos. Shipton, Jun., 12, High Street, Chesterfield.

Alchemilla conjuncta. Flowering-stem and two root-leaves of this almost rarest of British plants. Found in Cumberland some years ago, and preserved in a garden. I want *Arenaria Norvegica*, *Inula salicina*, or *Simethis bicolor*.—R. Wood, Vicarage, Westward, Wigton.

BOOKS RECEIVED.

"American Naturalist," for August.

"Canadian Entomologist," for August.

"Notes on Chalcidiæ." Part VII. By Francis Walker, F.L.S. London: Janson.

"Our Blood Relations." Simpkin, Marshall, & Co.

"The Flora of Liverpool." Published by the Liverpool Naturalists' Field Club.

"Half-Hours at the Seaside." By J. E. Taylor, F.G.S. London: Hardwicke.

"Smithsonian Report for 1870." Washington, Government Printing Office, 1871.

"Department of Agriculture Report, 1870." Washington.

"Monthly Reports of the Department of Agriculture for 1871." Washington.

"Report of the Commissioner of Agriculture on the Diseases of Cattle in the United States." Washington, 1871.

"Science and Commerce; their Influence on Manufactures." By P. L. Simmonds. London: Hardwicke.

Communications Received up to 12th.—H. E. W.—T. R.—A. S.—G. E. D.—J. F. T.—G. H. H.—H. L.—J. J. K.—A. H. C.—H. B. T.—W. T. P. W.—I. W.—H. G. G.—P. S.—W. H. B.—W. H. McL.—A. N.—J. L. C.—F. H. M.—J. P.—J. W. G.—W. R.—R. G.—J. A., Jun.—R. M. B.—J. F.—J. H. M.—J. S. B.—W. N.—F. I. W.—W. G.—J. M. C.—J. R S. C.—J. T.—S. A. B.—H. S. H.—G. T. N.—G. O. G. N. E. L.—W. F. D.—J. C.—M. G.—C. B.—J. C.—J. B.—W. B.—A. E. M.—T. W. C.—A. A.—R. L.—R. V. T.—J. S., Jun.—Rev. J. B.—H. F. H.—A. L.—W. F.—J. B.—A. C.—T. S.—M. B.—R. W.—W. L. B.—W. T. I.—R. B.

COLLECTING AND PRESERVING.

No. X.—COMMENTS ON COLLECTING AND SETTING LEPIDOPTERA.

"THERE is a right and a wrong way of doing everything"—so says the proverb: and having read the article on "Collecting and Preserving" in your late number, I am sorry to see, among much that is useful, a reproduction of several mistakes which may have become respectable by reason of age, and repetition by various authors of more or less eminence; but which are none the less mistakes.

In the hope that you may admit a kindly criticism of Dr. Knaggs's interesting paper, I will venture to suggest to beginners what experience has taught me to be a more excellent way. Collectors are recommended to set their lepidoptera on *corked* boards with *curved* surfaces, that is to say, rounded off gradually from the central line towards the sides. Now that seems to me to be a very absurd way of setting butterflies; the wings of the insect droop quite enough after they have been taken off the board, without requiring to be set in that position in the first instance. Specimens look much better in a collection where the wings of the butterflies and moths have been set so as to maintain a perfectly horizontal position, than they would do if they were all drooping; and the wings are also less liable to become crumpled in the setting, and are more natural.

The setting-board or saddle, then, should have a perfectly level and smooth surface on either side of the central groove, and soft planed wood is almost preferable to cork, having a more uniform surface. (See fig. 170.)

Again, with regard to the braces for setting, what advantage is there in having them pointed and fastened only at one end? Why should not the brace be of the same width throughout, and be continued over both wings at a time? It would thus exert a more equal pressure on the wings and keep them much better in position. They are also more easily cut.

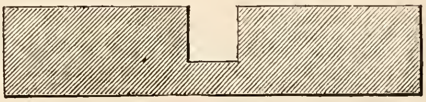


Fig. 170. Level Setting-board.

In the year 1869 I was spending the summer in Germany, and in the space of one month and a half I collected myself nearly three hundred different species of butterflies and moths, and I had every evening on an average between forty and fifty specimens to set, which I had captured during the afternoon, and the way I set them was the following:—

Using the level saddles which I have already described, made of soft deal, having pinned the body of the insect straight in the groove, so that the roots of the wings are on a level with the surface of the board, I cut a number of long strips of note-paper, the same width throughout, and the width varying with the size of the insect: generally, however, about one-sixth of an inch wide. Then taking a strip in the left hand, I fasten one end of it into the wood with a common pin, just above where the border of the front wing will come when in position; then holding the other end of the strip in the left hand, I place both wings of that side in position by means of a finely pointed needle and then stretch the strip of paper across them near their roots, and pin it below the lower wing. A similar strip is then applied to the opposite side, and then another pair external to these to hold the tip of the wings down. If the specimen is a very large one, it will require a third set. (See fig. 171.)

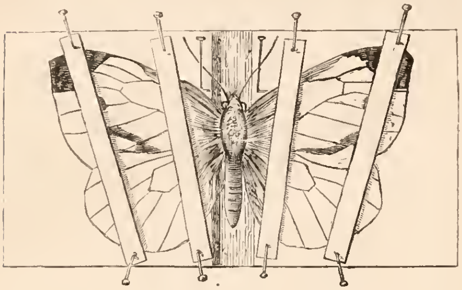


Fig. 171. Mode of setting out Lepidoptera on level board.

This seems to me a much easier, quicker, and more definite way of setting than that usually adopted, and the specimen is rendered more worthy of the cabinet.

With regard to the butterfly-net, I have often seen them represented in diagrams as fastened on to the end of a walking-stick. Now a walking-stick with a net at the end of it is of no use whatever. The net which I used was 1½ ft. in diameter, and 3 ft. long, and was at the end of a stick 7 ft. long; it was not heavy, and not at all inconvenient, and if properly handled could be rendered short or long as required. I always had a bag at my side with a strap over my right shoulder: in this bag were forty or fifty different-sized card-boxes, and whenever I caught a *moth* in the net, having thrown the net over the top of the hoop, I cautiously passed the open box into the net, and over the moth; I then passed the lid in between the net and the box until I could shut it and inclose the moth; then making the special mark for the day on the box-lid with a pencil, so as to distinguish it from those which were empty, I put it into the bag again.

The *butterflies* were killed with a squeeze when caught, and pinned and placed in a corked box. I carried my insect-pins in a flat pincushion fastened to the buttonhole of my coat, so as to be always ready at hand.

I found that bush-beating with a long stick was very profitable, especially on a dull day, and I always took a boy with me for that purpose, who walked about eight yards in front of me.

On reaching home, I set the butterflies first, before their wings began to get stiff; and then administered chloroform to the moths in the boxes one by one. I was surprised to find how much chloroform some moths, even of very small size, could take, and yet come round after it. In the case of larger ones, such as the Death's-head Moth (*Acherontia atropos*), and the Sphingidæ, having chloroformed them, I gave them a thrust under the thorax with the point of a penknife dipped in prussic acid.

Albion Place, Leeds. F. E. A.

NEW BOOKS.*

THE publishers' lists, as well as the falling leaves and the sharp nights, inform us that winter is nigh at hand. And, as will be seen from our catalogue below, the cheerful fire need not be without cheerful companionship. Those who are fond of following up the results of theoretical investigation into the world of practice, and of beholding the real greatness which ensues to a nation thus alive to the importance of science, cannot be otherwise than interested in Mr. Simmonds's book. It is not too much to say that no other Englishman could have written it, inasmuch as it is doubtful if there be another so well "up" in commercial science. The subjects discussed in this book of upwards of six hundred pages are of the highest importance, and include a thorough and detailed account of the mineral and animal substances entering into commerce; the cotton and woollen manufactures; the silk trade; glass, earthenware, precious metals, iron, paper, leather, groceries, &c., having separate chapters also devoted to them. When we remark that the statistics so copiously given are the most recent, and from the highest authoritative sources, and that all the latest applications of scientific discoveries are fully entered into, and all the multitudinous questions discussed, our readers may form some idea of the genuine practical character of the book. It is clearly printed, nicely got up, and written in a plain and popular style.

It is always a sincere pleasure to us to recommend works to our numerous readers, that are equally pleasant and profitable, and never did we more sincerely than in introducing Canon Kingsley's and Professor Nicholson's books. The members of the Chester Natural History Society are indeed fortunate, for Canon Kingsley's is not the first book we have had the pleasure of noticing which originally made its appearance before them. As a popular and pleasing writer on natural science, we

* "Science and Commerce: their Influence on our Manufactures." By P. L. Simmonds. London: Hardwicke.

"Town Geology." By the Rev. Canon Kingsley, F.L.S., &c. London: Strahan & Co.

"Introduction to Biology." By Professor H. A. Nicholson. London and Edinburgh: William Blackwood & Sons.

"The Vegetable World." By Louis Figuier. London: Cassell & Co.

"Half-Hours by the Seaside." By J. E. Taylor, F.G.S. London: Hardwicke.

need not announce that the Rev. Charles Kingsley occupies the first place. But we do not think that he has written a book which will be received with more pleasure than that now before us. Its geology deals with the commonest objects—the soil of the field; the pebbles in the street; the stones in the wall; the coal in the fire; the lime in the mortar; and the slates on the roof; so that, in this manner, all the geological formations in the neighbourhood of Chester are popularly and exhaustively treated. So far, these chapters have made their appearance before in one of the leading magazines. But what has never yet been before the public, and which, in our eyes, is the best part of the book—is the long and elaborate preface of fifty-six pages. There are portions of this we should like to have read by every person in the United Kingdom. Its style is thoroughly "Kingsleyan," and its reverent earnestness will be sufficient to convince every one of the grand displays of the Divine character which are hidden from those who do not study "the word of God as revealed in facts," as Bacon expressed it. There is a manly and healthy tone about Mr. Kingsley's views of the relations of science and religion that cannot but wean prejudice from its conceited narrowness. Space forbids us to do more than simply recommend our readers to procure this book, and to conclude with the following quotation from it:—"I grudge that epithet of secular to any matter whatsoever. But I do more; I deny it to anything which God has made, even to the tiniest of insects, the most insignificant atom of dust. To those who believe in God, and try to see all things in God, the most minute natural phenomenon cannot be secular. It must be divine; I say, deliberately, divine; and I can use no less lofty word. The grain of dust is a thought of God's; God's power made it; God's wisdom gave it whatsoever properties or qualities it possesses. God's providence has put it in the place where it is now, and has ordered that it should be in that place at that moment, by a train of causes and effects which reaches back to the very creation of the universe. If it go up to the physical heaven, and float (as it actually often does) far above the clouds, in those higher strata of the atmosphere which the aëronaut has never visited, whither the Alpine snow-peaks do not rise, even there it will be obeying physical laws, which we term hastily laws of nature, but which are really the laws of God; and if it go down to the physical abyss—if it be buried fathoms, miles below the surface, and become an atom of some rock still in the process of consolidation—has it escaped from God, even in the bowels of the earth? Is it not there still obeying physical laws of pressure, heat, crystallization, and so forth, which are laws of God—the will and mind of God concerning particles of matter?"

Professor Nicholson's "Introduction to the Study of Biology" is a book very much needed by the student, who is apt to get bewildered by the jargon of the schools, and to lose the facts of science in the high-sounding terms which are selected to express their generalizations. It is well done, and contains evidences of sincere and earnest work. In the parallel study of recent and extinct animals, this "Introduction" will be of great value. Everything that by any possibility is included in biology is discussed. The wonder is how Professor Nicholson manages to turn out so many books, and to turn them all out so well! This little work, however, will bear favourable comparison with any of his previous ones, not only in its careful finish, but in the clear and original manner with which biological theories and hypotheses are laid before the reader.

M. Figuier's "Vegetable World" is pretty much of the character of the other "worlds" which that ingenious creator has evolved. If we were asked to select the best of his books, however, we should undoubtedly pick out that before us. Its wealth of illustration, and the high finish of the woodcuts, would alone recommend it. But there can be no doubt as to the attractive style in which M. Figuier writes, whatever may be said about the accuracy of his science. There is a sad want of scientific order in his arrangement of the subject-matter, and, bee-like, we find him off one scientific sweet on to another, as vagary leads him. The present edition is "new and revised," and is much better as regards its scientific arrangement than the preceding. It includes the Organography of Plants, their classification, systematic arrangement, and geographical distribution. In the last chapter there is much that is crude and incoherent, besides the fault of its ignoring the most recent discoveries and generalizations on this important question.

The season is now gone for the *practical* use of the last book on our list, although it may be found useful for winter study. Modesty, however, forbids us doing other than quoting from its preface:—"An attempt has been made to introduce the subject-matter in as methodical and scientific a manner as possible, so that each chapter might be a sketch of the natural history, classification, and affinities of the animals described. In this manner the young beginner will be brought into direct acquaintance with the first principles of zoology. When possible, the embryological relations of the various forms, and the geological antiquity of the genus or family to which they belong, have been introduced. Thus it will be seen that, apart from the interest attached to the study and observation of the habits and economy of our commonest seaside objects, there are also connected with them some of the profoundest speculations of modern philosophy."

THE SPONGEOUS ORIGIN OF FLINTS.

By Fred. Kitton.

THE position of the Sponges seems to be midway between the Amœbæ and the Foraminifera, the former consisting entirely of sarcode, and without any kind of spicula or external shell; and the latter possessing a shell composed of one or more chambers. The sponges, although destitute of an external shell, possess a keratose skeleton, strengthened in the majority of cases by calcareous or silicious spicula.

The vital and therefore the most important part of the sponge is the sarcode, and with your permission I shall endeavour to give as lucid a description as possible of the important part performed by this material; and perhaps the best idea of it can be obtained by soaking a piece of isinglass in water. The living sarcode, like the softened gelatine, is semi-pellucid, varying in colour from external causes, and during life insoluble in water.

The absence of special organs in the Amœbæ, Sponges, &c., clearly indicates that the power of assimilating nutriment is possessed by this material, and identifies it with the sarcodous system, covering the digestive surfaces of animals. We can trace the presence of this wondrous matter from the highly-developed mammal to the humble amœba; other organs may become obsolete, and at last we find that sarcode alone remains. And this apparently inert, shapeless, structureless mass of jelly is endowed with the power of producing those elegant forms known as polycystina and foraminifera, or, as is the case with the sponges, the multitudinous varieties of spicula (Bowerbank figures and describes between two and three hundred distinct forms of spicula, and does not then describe all the forms), and even builds up with silex abstracted from the waters a silicious skeleton of surpassing beauty, as seen in the *Euplectella* and *Dactylocalyx*, or elaborates long bundles of silicious fibres, as in *Hyalonema* and *Pharonema*.

Another substance found in sponges, and that with which we are best acquainted, is keratode, or horny fibre: this, like the silicious framework just alluded to, is invested with sarcode. In some genera (as in the sponges used for domestic purposes), no spicules are formed; in others the spicules predominate.

As we find among the foraminifera certain forms which do not secrete a shell, but form one by gluing together minute grains of sand, so may we also detect certain species of sponge in which the skeleton has neither silic nor solid keratose, but is composed of grains of sand inclosed in a thin keratose covering.

I must, however, now call your attention to the protoplasm found in layers on the ooze at the bottom of the sea. Those of us who attended the Biological section of the British Association in 1868, will remember an interesting paper by Professor Huxley on Bathybius, in which he described this sarcodous layer, and the remarkable forms occurring in it, known as coccoliths and coccospheres. These forms may be found in chalk, clearly indicating that the bottom of the sea, during the Cretaceous period, was also covered in places with protoplasm. I must ask you to bear this fact in mind, as I think we shall find that it has an important bearing on the theory of the Spongeous Origin of Chalk Flints.

If a thin chip or section of flint is submitted to microscopic examination, sponge spicules in more or less abundance will invariably be seen; mixed with these will be found casts of the interior of the chambers of foraminifera, fragments of polyzoa, and small molluscous shells.

When a recent sponge is examined, similar organisms will be seen entangled in the reticulated skeleton. A cretaceous flint, like silica obtained by dialysis, is non-crystalline, breaks with a distinct conchoidal fracture, is singly refractive, and therefore is not affected by a polarized beam of light, in this respect resembling silica taken up by undoubted animal or vegetable organisms. I may, perhaps, be reminded that the cuticle of the Dutch rush and the stellate hairs of Deutzia, both of which are silicious, do polarize, and exhibit brilliant colour when examined by light in that condition; but this is not in consequence of their silicious nature, but is due to the presence of a membraneous film investing the cuticle or hair. If a piece of Equisetum or Deutzia is boiled in sulphuric acid, and then decarbonized with chlorate of potash, a display of colour will no longer be visible. The shells of the polycystina, sponges, spicules, and the diatomaceæ are all singly refractive.

The base of silica is silicon. Silica under certain conditions is soluble in water to a considerable extent. Waters holding silica in solution,—that is to say, in any large quantity of it,—are now extremely rare; the Geyser and Rykum in Iceland, and the Pennakoon and Loongootha in India, are the best known. An analysis of a gallon of the Geyser water showed 31·50 of silica. It is highly probable that silica was present in larger quantities in the earlier epochs of the world. This, however, is not a question of much importance, as we know that it exists in a soluble form, and is eliminated, often in great abundance, by various organisms. I need only refer you to the Alcyoncellum, Hyalonema, Pharonema, and other silicious sponges, as evidence of that fact.

The presence of silica in a state of solution being an ascertained fact, there is nothing improbable in the hypothesis that sponges should have formed the nuclei of these flinty concretions: the silicious spicules would possibly exert an attractive influence upon the atoms of silica in solution, in a similar way that a crystal of saltpetre would be the starting-point for further crystallization in a solution of that salt.

Another and still more effectual cause of the elimination of silica would be the decomposition of the sarcode and keratode material; as this goes on certain gases are produced, and the silex precipitated from the solution.

The discoveries of Wallich, Carpenter, and others, of protoplasm or sarcode existing at the bottom of the ocean, and to which I have previously alluded, appear to afford a probable explanation of the cause of solution to the flinty layers found in some of the chalk strata. The opponents to the spongeous origin of flints brought forward the existence of these layers as a proof that sponges were not the nuclei of flints, and until the existence of this free sarcode was detected, the occurrence of flints in some localities in the form of nodules, and, in others as layers, was difficult to account for; but when it was found that sarcode existed in masses covering a considerable area, a clue to the formation of the flint layers became apparent. Carbonic acid gas and hydrogen were liberated when decomposition set in, and silex replaced the sarcode. That flints are now forming, is, I think, as certain as the formation of new beds of chalk; and it is an ascertained fact that valleys in the bed of the ocean are, as in days of yore, being gradually filled with calcareous matter intermingled with remains of sponges, or permeated with protoplasm: these, as decomposition slowly takes place, are separating the silica from the surrounding waters.

Fig. 172. Polypothecia × 150 diameters, green sand, Warminster, Wilts.

It will, I think, be allowed, that flint nodules could not have been found in chalk unless a nucleus had existed; the silica contained in the water was chemically combined with it, the chalk only mechanically, and if any silica was parted with, it would only act as silicious cement hardening the atoms of chalk.

The probability that flints are still in the process of formation is confirmed by the frequent discovery of silicious casts of foraminifera; those usually found are composed of silex, with traces of iron, giving them an olive-green colour, precisely like those found in the green sand.

In a dredging made at Porto Seguro by Capt. Perry, of Liverpool, I found many shells of foraminifera, which, when acted upon by acid, showed the interior filled with a silicious cast of the internal chambers, and in some specimens even the pseudopodal apertures had also been filled with silex: fragments of other silicified organisms were also of frequent occurrence. The casts found in this dredging differed from those usually found by the absence of any trace of iron, and appeared to be silica in a similar condition to the ordinary chalk flint.

Fig. 173. Polypothecia × 150 diameters, green sand, Carrow, Norwich.

In the green sand large silicious nodules, known as Polypothecia, are of frequent occurrence, and when thin sections are examined their spongeous origin is distinctly seen. These nodules were, however, formed under somewhat different conditions to the ordinary chalk flint; the silica is distinctly crystalline and doubly refractive, and polarizes like quartz or agate; the sponges were also probably different from those belonging to the chalk. A careful microscopic examination of very many sections did not reveal the presence of any form of spiculum; they were most likely allied to the recent keratode sponges; in fact, a thin slice of ordinary domestic sponge greatly resembles a section of its silicified predecessor. The reticulations are not solid, but tubular, and I have been able, in many cases, to fill them with colouring matter.

The above figures are from camera lucida drawings of sections of Polypothecia;—fig. 172, from the green sand, Warminster; fig. 173 from a fragment obtained from Mr. Colman's artesian well, at Carrow, Norwich.

The following extract from a paper on the process of silicification of animals, read before the Geological Association last year, by Mr. H. M. Johnson, F.G.S., may perhaps be of interest. The author points out "how a crop of sponges invested with their gelatinous flesh or sarcode, and living at the bottom of a deep ocean, were suddenly buried in a thick stratum of white mud, consisting of the minute shells of foraminifera; that they then died, and that while in the process of decomposition this interchange of materials took place; the nascent carbonic acid parting with its carbon in exchange for the silica of the silicate of soda which sea-water is known to contain."

To illustrate the power possessed by decomposing organic matter he produced two tadpoles, or rather one and the remains of a second. The first had been placed in a solution of silica, and after the lapse of a few hours was submitted to the action of nitric acid, without any apparent injury: the other, which had not been submitted to the silicifying process before being placed in the nitric acid, was instantly destroyed, the only trace of it being a little brown cloud floating in the acid.

The discoveries made in the dredging expeditions of the *Porcupine* and the *Norna* have given an impetus to the study of the sponge forms, and although we may not have the opportunity of adding new genera or species, all of us who possess a microscope can study the life history of the common fresh-water sponge, *Spongilla fluviatilis*. It may be found in almost every pond or small stream, and a few hours' study of a fragment of a living sponge will give the observer a better idea of that marvellous substance we call sarcode or protoplasm, than any lecture or paper can ever hope to do.—*Trans. Norfolk and Norwich Naturalists' Soc.*, 1872.

NOTES ON NATURAL HISTORY IN THE NEIGHBOURHOOD OF ROTTERDAM AND GHENT.

THE STORK.—I saw nothing of this bird in Rotterdam itself; perhaps the place was too busy for it. At Delfshaven, a village near the town, a party of storks had taken up their abode. There were seven of them; I think they were the two old birds and five young ones. The nest was on a low brick chimney, right in the village; the nest was much larger than the chimney, and projected all round. When I first saw them, on the 15th of July, they were all full-grown; they hovered and wheeled about at a great height in the air, as if practising for their departure southward, which took place about the end of the month. The birds seemed very tame, and swooped down between the houses quite fearlessly. Their resting-place was the ridge of the church roof, where they stood on one leg, in the sun, cleaning their feathers. In the fish-market at the Hague there were some tame storks that fed on the refuse from the fish. They did not seem in very good condition; perhaps the fact of their not migrating did not agree with them.

Rude figures of this bird constantly occur in bits of wood carving over doorways, &c., or cut in stone on the houses in Rotterdam, while nearly all the country cottages have a curious sort of iron dome-shaped frame over their chimneys, which are supposed to induce the storks to build. The latter are believed to bring good luck with them. The Heron, as would be expected, was very plentiful, both in Holland and Belgium, and birds in general were very abundant about Rotterdam; quite different from France in this respect. I was told by a naturalist that plovers differed slightly in plumage from English ones.

Amongst the fresh-water *Mollusca*, the *Unionidæ* hold an important place. The commonest species about Rotterdam was *Unio pictorum*. The shells were longer and thinner than my Thames specimens. I noticed quantities of rotten shells of this species and *Anodonta cygnea*, in the sandy loam that had been cut for a new canal. There were also large tree-trunks lying in the soil, which is quite destitute of stones. In a heap of gravel, which, I was told, had been brought down from the Rhine, there were a number of *Unio littoralis*. I had never met with it in a living state before, although it occurred in a fossil state, associated with recent land and fresh-water shells, *Cyrena fluminalis*, and elephant remains, at Erith, where I got fossil specimens. *Anodonta cygnea* was common enough, but I did not see any large specimens; those from the canal at the Hague were small, ventricose, and ill-formed; perhaps the sandy bottom in most of the canals is unfavourable to the species. *Dreissena polymorpha* was very plentiful in the river Maas. About Rotterdam the water is quite fresh, although rising and falling with the tide. The sandy soil on which the town is built is full of dead shells in places, of fresh-water species, *D. polymorpha* amongst them.

The sea mussel (*Mytilus edulis*) is very much eaten in Holland and Belgium. In Ghent it was served up as a delicacy at dinner. In the museum there is a picture by Albert Cuyp, at Rotterdam, of a blacksmith leaving his forge to come out and eat mussels, with a group round him, just such as you see in the back part of Rotterdam at present round a mussel-cart.

The Goat-moth (*Cossus ligniperda*) infested the endless rows of pollard willows along the roads and dykes. The perfect insect was over; but there were lots of empty pupa-cases sticking out. One of these moth-infected trees was the centre of attraction for a number of large Tortoise-shells (*Vanessa polychloros*) and other insects. On the sand-hills near Schevening I saw a Queen of Spain fritillary (*Argyrus lathonia*), but searched in vain for *Picris Daplidii* and *Colias hyale*, which were so common in Brittany. The flora of these sand-hills was different from both those of Brittany and the English ones. I have seen amongst the flowers *Saponaria officinalis*, the "Soapwort," which was very conspicuous.

The Water Villarsia (*Villarsia nymphæoides*) was very plentiful in the smaller ditches, and the Marsh Sow-thistle (*Sonchus palustris*), also the flowering rush (*Butomus umbellatus*) flourished everywhere.

In the neighbourhood of Ghent, in Belgium, the Gipsy-moth (*Liparis dispar*) was so abundant as to be quite a feature in the natural history of the district. In some places the roadside pollard poplars were inhabited by the female moth, cocoons, larvæ, and eggs, all at the same time, while the male insect flitted up and down with the same sort of zigzag, rapid flight as the Vapourer moth, in the sunshine. As far as flight was concerned, it seemed to me the female Gipsy-moth would have done just as well without wings, for I never saw any of them move. They clung to the bark with great tenacity, and after laying their eggs, remained resting on the trunks till they died and fell off, or the rain washed them down. The females varied a good deal in size and colour. The eggs are not at all concealed; as the colour of the down with which they are covered seldom matched the tint or texture of the bark on which they were placed: they appeared to prefer the south side of the tree-trunk. The slight cocoons were spun on the rough bark, sometimes one or two over the other. My observations dated from the 4th of August.

A friend of mine, residing in Antwerp, told me he was summoned by the civil authorities to show why he had not killed the caterpillars in his garden, and he found there was a law compelling every one to kill the caterpillars on his premises. Those of the Gipsy-moth must afford them considerable trouble, from their numbers. The Swallow-tail (*Papilio machaon*) was to be had in the clover-fields about Ghent. Those I saw were in good condition, and belonged to a second brood. I took some once about the same date at Horning Fen, in Norfolk.

There was an interesting section of the sandy strata on which the town is built, under the fort, where some excavations had been made. As far as I could tell, they appeared to be marine Tertiary, lower Eocene; they contained a good many fossils, a species of *Ostrea*, a large *Cardium*, a *Solarium*, and a number of shark's teeth and fish-remains. I should say the spot would be a profitable one to a geologist; it is close to the town.

HARRY LESLIE.

A MYCOLOGICAL RAMBLE.

A LATE number of SCIENCE-GOSSIP and the propitious weather induced me a few days ago to revisit a woodland spot about two miles off, which during the years 1854-9 I used very frequently to explore for fungi. I was then alone, but this time I had with me five young companions, some of them keen observers and collectors, and all of them well able to attest the delight of a successful mycological ramble. Ours lasted about two hours and a half, in the afternoon. A few only of our findings can be mentioned, but these may suffice to show the variety of beautiful and interesting fungi obtainable during a short autumn walk in a good locality.

Amongst the Agarics the Amanitæ were not so numerous as we had anticipated. *A. rufescens* abounded and was in great perfection. *A. phalloides* and *A. mappa* were found, but not satisfactorily exhibiting the delicate and finished structure proper to this royal family amongst the fungi. *Tricholoma rutilans*, with its pileus like the sunny side of an American peach, was worthy of itself. *Clitocybe infundibuliformis* showed a chalice neater than the finest work in terra-cotta. A magnificent tuft of *Pholiota aureus* was descried far enough off to give scope for a good race. A fine Psalliota, tall and large, with bright yellow pileus and base, was received with the remark—"it is not in our books," though I have seen it figured somewhere very recently. *Paxillus involutus* was, of course, not rare, and *P. panuoides*, very like a golden Chantarelle, grew where it did in 1858, on the spot from which it was sent to be identified by the Rev. M. T. Berkeley. I must not attempt to mention my old favourites the Mycenæ, graceful as ever, though many familiar forms were absent. The Boleti, Pezizæ, and Sphæria, were not very numerously represented; possibly some of the finest species had passed away. The Polypori, however, were in grand condition. The common *P. squamosus* has, I think, seldom been seen to greater advantage. *P. intybaceus* was hailed, as well it might be, with great delight, its many confluent stems looking as if sculptured in Bath stone. *P. betulinus* was first descried growing on a broken branch of a birch-tree, more than 20 feet from the ground. The necessity for a climb was happily averted by the discovery on the ground of a portion of the broken branch on which were growing four beautiful specimens. Some sacrilegious hand or foot had made sad havoc with a noble growth of *P. giganteus*, which was still beautiful even in its ruin. Several smaller species occurred; amongst them *P. picipes* and *P. adustus*. The species of Stereum were only just beginning their winter growth. The specimens of Fistulina were Protean in shape, colour, and size. The Clavariæ yielded the coral-like *C. rugosa*, and flaming tufts of *C. inæqualis*, almost equalled in size and surpassed in colour by *Calocera viscosa*. These formed, numerically, a small proportion of the fungi collected in a locality where lichens are almost absent, mosses not plentiful, and sealeworts are becoming scarce, owing, as I believe, to the impurity of the atmosphere, and where almost the only flowering plants of much botanical interest are *Scutellaria minor* and two species of Potamogeton.

Just as in our native Entomology, the study of the Hymenoptera, when once fairly entered upon, affords more of biological interest than the study of all the other orders of insects put together; so I believe it to be with Mycology, as compared with other departments of Botany.

Henry H. Higgins.

A CURIOUS BRITISH PLANT.

The little plant, of which the accompanying figures are illustrations, appears to the writer to possess considerable interest, and to be undoubtedly a cross or hybrid (and to some extent a fertile one) between the Bilberry or Whortleberry (*Vaccinium myrtillus*) and the Cowberry or Red Whortleberry (*V. vitis-idæa*), though it is but candid to observe that this last point was doubted by several Fellows of the Linnean Society, at one of the meetings of which it was lately exhibited. The following more particular description will, we think, be sufficient to convince any botanist that the plant can neither be considered as *V. myrtillus* nor *V. vitis-idæa*, but must be a cross between the two.

A large tussuck or clump of the plant was first noticed a few years back in a rather interesting locality in Staffordshire, mentioned in the "Origin of Species,"* as an instance where the fencing and introduction of one plant (the Scotch fir) has produced a remarkable change in a portion of a large and barren heath, which had never before been touched by the hand of man—a change in the relative proportion of the heath plants, in the relative number of other flowering plants, or an excess of them in the inclosed part of the heath, and the advent in it of several insectivorous birds, different from those on the still wild moor. We may ourselves notice the *Sirex gigas* and *S. juvencus* amongst insects as having become frequent in the wooded part.† We do not suppose, however, that this change of vegetation has anything to do with the production of the plant in question, and need only add here that all around the supposed hybrid, in society and even in contact with it, is a profusion of both the species of Vaccinium above mentioned.

Even at the first glance it would require a stretch of credulity to suppose, as has been supposed, that a plant with a large sweet black berry, and a flower globular like the glass shades used to cover gas jets, can be a variety of the cowberry, with its smaller crimson acerb berry, and divided patulous flower. We should be rather disposed to appropriate it to the bilberry; but thence we should be deterred, *primâ facie*, by its non-deciduous leaves, and rounded twigs, so very different from the bilberry's.

Fig. 174. Hybrid Bilberry.

To proceed with the description of our plant, the leaves are coriaceous or thick like those of the cowberry or box, not thin and membranous as in the bilberry, though they are well serrated, like those of the latter plant; neither are they so blunt and

* 1859, p. 71.

† The hills were planted by Mr. Wedgwood, the eminent potter, and are called the Maer and Camp Hills, the latter name from several Saxon encampments and mounds situated on their summits.

obovate as those of the cowberry, and have only a slight trace of the glandular dots so conspicuous on their under surface; neither are their margins revolute. The berries are occasionally scattered and axillary, as in the bilberry, but chiefly terminal, as in the cowberry, though then solitary or few in number, unlike what they are in the clusters of the latter; on this account called bunch-berry here. The shape of the corolla has already been referred to as exactly that of the bilberry's, but white and transparent, or tinged with pink, not red. The calyx is also leafy, and divided as in the cowberry. The curious stamens are shaped as in Vaccinium generally, being like two slender flasks joined together and opening at the tip of the necks; they agree with the bilberry in having the side-horns or processes, but smaller: these are absent in the cowberry; on the other hand, they have the curious hairs on the filaments,

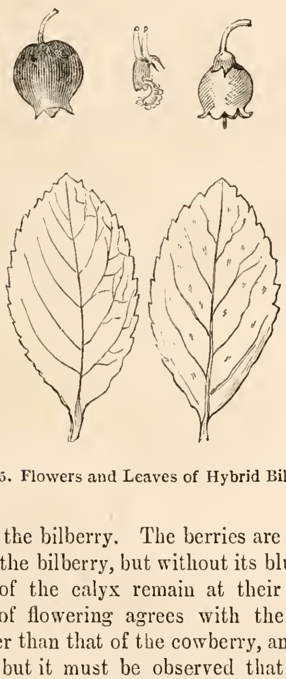


Fig. 175. Flowers and Leaves of Hybrid Bilberry.

not seen in the bilberry. The berries are black and large, as in the bilberry, but without its blue bloom; the teeth of the calyx remain at their summits. The time of flowering agrees with the bilberry, being earlier than that of the cowberry, and so with the fruit; but it must be observed that both the bilberry and the hybrid flower or fruit to a less extent almost the whole year round, which is less the case with the cowberry, it fruiting in August. There are especially two crops of bilberries in the year; one about midsummer, the other late in autumn: for instance, we purchased them on October 27th of last year. To our taste the fruit of the bilberry is pleasant when cooked, and, we believe, little likely to disagree with the partaker; the cowberry differs but little in flavour from the scarcer and much dearer cranberry, for which it is sometimes sold to the unobservant.

The hybrid is handsomer in its foliage and less straggling than the cowberry. It flowers and fruits much more scantily than either of its parents. The microscope shows that the grains of its pollen are generally shrunken, though a few present the plump tripartite form common in the genus. In such berries as were examined there were not more than from two to five apparently perfect seeds, whilst there were a dozen or more in the cowberry, and twice as many in the bilberry.

Such are the characters, pretty carefully observed, and faithfully described, which led the friend* who first noticed the plant, and who forwarded it to me, as well as myself, to consider it to be a hybrid. In fact, no botanist could find good reasons for arranging it with either the bilberry or cowberry exclusive, the two sets of specific characters being so mixed.

An eminent observer, who was good enough to look at the plant, suggested that if it were a hybrid it would be found, most probably, to be barren; and the scanty flowers and berries, as well as the very few perfect seeds and the shrunken pollen, bear out the latter surmise to some extent. The wonder is, how it happens that our two common Vaccinia, growing both together in profusion on our hills, are not oftener crossed. Perhaps the somewhat different time of flowering may be one cause, and another the perfect shielding in most of these plants of the pistils from foreign pollen by the globular corolla. The use of the horns on the anthers of the bilberry, and the protrusion or not of the stigma from the corolla in heath plants are also subjects for thought or research.

Though plants growing in great profusion are apt to vary, yet we only know of one marked variation of the bilberry, and that in a spot two or three miles from the locality already mentioned. On one hillock, in the open glade of a fir wood, the bilberries are all (instead of their usual black colour with a fine bloom) of a transparent yellowish-white, a little mottled with pink. This, however, constitutes a very different case from the previous one.

R. Garner, F.L.S.

ON THE ABUNDANCE OF VANESSA ANTIOPA IN 1872.

The sudden appearance in considerable numbers of that rare butterfly, the Camberwell Beauty (*Vanessa Antiopa*) throughout the east and south-east of England, and more sparingly throughout the country, seems to call for some special notice.

This species is common in most parts of the Continent of Europe, extending as far north as Lapland, and seems to be pretty constant in its numbers; but the great uncertainty about its appearance in this country has been noticed for a long period.

* D. Ball, Esq., F.R.C.S.

Moses Harris, writing in 1775, does not speak of it as any rarity; but Berkenhaut, in 1789, writes, "very rare in this kingdom." In 1793 it received the name of "The Grand Surprise" from Harris and the Society of Aurelians (as entomologists were then called), of which he was a member, on account of its sudden appearance in extraordinary numbers. Donovan (1794) states that there have been several instances in mild seasons of its being as common as the Peacocks and Admirals (*Vanessa Io* and *Atalanta*), and that in 1793 it was as plentiful in some places as the common garden whites usually are near London. Curtis, in his "British Entomology," says that a few were taken in Suffolk in 1819, and that Mr. Samouelle took one hybernated specimen the following spring, but that it had not been seen for many years before.

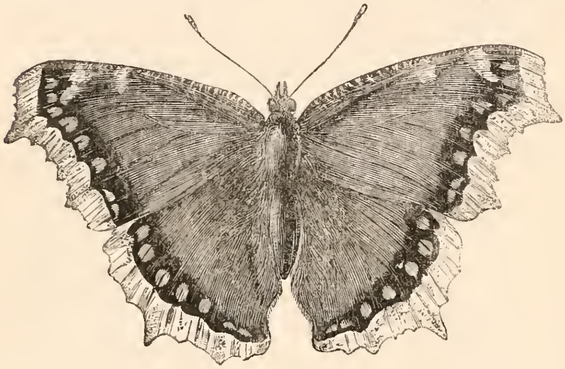


Fig. 176. Camberwell Beauty (*Vanessa Antiopa*).

Wood, in his "Index Entomologicus in 1839," records it as occurring in woods in Surrey on the oak, and also that a specimen had been taken near Norwich in May.

The year 1846 has been called the Antiopa year (a name which it can now hardly retain), from the numbers which were then seen and taken in many parts of the country. The next spring hybernated specimens were met with, but it then became as rare as ever. I am informed, however, that one specimen was seen at Easton, near Norwich, on July 31st, 1847, or 1848, by Mr. J. H. Gurney. I have no notices at hand of its occurrence during the next few years, but in 1856 one was seen in the spring in the Isle of Wight. In 1857 five were taken—one in Norfolk, two in Essex, one in Lancashire, and one in Northumberland, and a sixth was seen. In 1858 the same number were taken—two in Essex, one in Norfolk, and two in Lancashire; in 1859, two in Yorkshire; and in 1861, one near Coldstream. No more seem to be recorded till 1865, when one was taken at Tenterden and another seen at Ilfracombe. None were seen for the next two years, but in 1868 fourteen were noticed—four in Norfolk (two of which were taken at Sparham), one at Ipswich, one at Chatteris, *six* near Cambridge, and one each at Tadcaster and Grundisburgh. Notwithstanding this unusual number, no hybernated specimen seems to have been noticed in the following spring, nor is any specimen recorded for that year; but in 1870 specimens occurred at Rochester, Cheltenham, and in Suffolk; and in 1871, one at Sevenoaks, and one seen at Buxton, near Norwich, on a bleeding alder-tree, by my friend Mr. F. P. Wheeler.

Of the grand appearance this season, the head-quarters seem to be Norfolk, in which county at least fifty have been seen and thirty taken, and the remaining eastern counties have come in for a very large share. It is obvious that the numbers recorded are but a portion of what have been seen; for instance, the Editor of SCIENCE-GOSSIP was so overwhelmed with notices that he could not find room for them (see page 234), but from the records published in the *Entomologist's Monthly Magazine*, and Newman's *Entomologist*, sufficient statistics can be gathered to show in some degree the relative numbers. In Cambridgeshire at least twenty-five have been seen and many captured; Suffolk records from twenty to thirty; Essex over twenty; Kent twenty-three, and others seen; Yorkshire thirty; but Lincolnshire only five, a disparity which must surely arise from a want of observers.

The southern counties come next—Sussex with four taken and others seen, Surrey thirteen, Hants seventeen, and Berks two; and there seems to have been a good sprinkling over the central counties, as in Middlesex six are recorded, in Herts five and "several," in Hunts two, Bucks one, Leicestershire one, Derbyshire ten, Nottingham one, and Staffordshire four, and others seen. Even the North has made a good show—Durham four, Northumberland one, and eleven in different parts of Scotland. The district in which they have been rare is the western, there being only notices of three in Lancashire, one in Cheshire, three in Wales, and one in Somerset. Ireland does not appear to have furnished a single specimen.

In the *Entomologist's Monthly Magazine* for this month (October) is an able paper by Mr. Stainton on this subject, in which he adduces forcible arguments to prove that these insects are not bred in this country, but are only immigrants from Norway.

This view is powerfully supported by the comparison given above, of the numbers seen in different counties and districts, and also by the fact to which Mr. Stainton draws attention, that so many of the captures were made on the coast. Even the earliest recorded specimen this year, on July 26th, at Yarmouth, occurred after twenty-four hours of stormy east wind. Moreover, the white margins, which have been looked upon as the peculiar property and *proof* of British specimens, turn out to be shared by those of the Scandinavian peninsula as well as of those of Silesia and the Alps. In any case, this distinguishing character would fail us this year, for specimens are recorded in both Lincolnshire and Lancashire with yellow borders; and Mr. Frank Norgate, of Sparham, Norfolk, in writing to a friend, says: "It [a specimen taken on October 7th] is the thirteenth specimen that has been caught in this immediate neighbourhood. They vary in size and colour, some having decidedly yellow, and others white, borders to their wings."

There are, however, serious difficulties in the way of accepting the theory of migration in this case. All the migrations of butterflies which have been noticed seem to have been in large swarms or flights, this being an important business, which they prefer to undertake in companies. Accordingly, it seemed desirable to ascertain whether they had been *first* observed *in numbers* on any part of our coast; and as the neighbourhood of Cromer, Sherringham, and that district of the north-east of Norfolk seems to have yielded the largest numbers, and as, moreover, that is the very district in which the greatest number of birds migrating southward commonly arrive, I have been at some pains to obtain accurate information from that neighbourhood. The results are not as might be expected in the case of an immigration. Mr. H. M. Upcher, of Sherringham, writes: "The first one I saw was on August 20th, three miles inland; the next day, one by the side of a covert; 23rd, one at Salthouse; 24th, five at Sherringham, and one at Hempstead; 29th, five at Sherringham. Most of them were quite in the middle of the covers, in an open spot called the Green-lane." Similarly, the Rev. T. H. Marsh, of Cawston, found them at Cawston and Drayton, near Norwich; one on August 20th, two on the 21st, three more on the 23rd and 24th, apparently fresh from the pupa; two on the 26th, three on the 28th, and so on. And Mr. C. M. Lowe, writing from Cromer to the *Entomologist*, says: "We have seen eleven here within the last few days." More inland, they appeared almost at the same time at Cambridge; one on August 22nd, six on the 24th, five on the 25th, one on the 26th, six on the 28th, and so on. In other counties the first records are Suffolk, August 24th; Essex, 23rd; Kent, 25th; Yorkshire, one on the 16th, others on and after the 21st; Lincoln, middle of August; Hants, 22nd; Surrey, 16th; Middlesex, 25th; Staffordshire, 18th and 22nd; but in Scotland, one as early as August 3rd; the rest from the 21st onward. In the western districts they were later. Wales, August 27th; Lancashire, September 4th; and the greater portion of these dates would be perfectly in accordance with the idea of a migration, if it could be shown that a large number had appeared on the eastern coast on August 20th instead of only two solitary specimens. As it is, if we accept the immigration view, we must suppose that a succession of stray specimens must have come over at intervals, a few appearing from July 26th to Aug. 16, and a larger number from August 20th to 28th. Mr. Stainton, however, suggests that the earlier specimens may be true natives, in which case the number of *them* would be above the usual average.

Another difficulty is the appearance of a considerable number of specimens on the southern coast in Hants and Sussex simultaneously with those in Norfolk and Yorkshire. These would hardly have crossed the country at once, and their white borders forbid the idea that they might have come from France.

Supposing, however, that all were *bred* in this country, the appearance of one or two at first, and after a few days of larger numbers, would be entirely in accordance with the usual habits of insects when emerging from the pupa, as also would their earlier appearance in the east and south than in the north-west of England.

That the larvæ have not been noticed this season would readily be accounted for by the fact that they feed in companies on the trees, probably high up, and that their work would very likely be mistaken for that of an early brood of *Pygæra bucephala* (the Buff-tip moth).

A third objection to the migration view is the extreme fineness of the specimens first taken. My friend Mr. Wheeler, who saw some of the earlier Cambridge specimens, tells me that they were in the most perfect condition, evidently fresh from the pupa—indeed, in one case the wings seemed hardly dry,—and that they seemed to have been reared upon the willows about which they were first discovered. Mr. Upcher writes: "Most of the specimens caught are so fine and fresh that they cannot possibly have undergone a sea voyage." The Rev. T. H. Marsh says: "Beautifully fine and fresh, apparently just out of the pupa." And two or three that have come under my own observation seemed to have the bloom so fresh upon them—the nervures being still well clothed with scales—that it was difficult to suppose that their wings could have been used for a long flight.

Mr. Haworth's idea that the eggs remained dormant for many years until special circumstances brought them to life, is well known, but does not find favour with many entomologists. My own has been that the butterfly occurs *every* year in this country, since it is noticed and recorded in the majority of seasons; and that most of the young larvæ usually perish from the dampness of the climate, but that in this season the extreme heat of the first three weeks of July enabled them to feed up safely. This supposition is favoured by the fact that specimens are recorded in many different years in Lancashire—a county unfavourably situated for migrants; and this, I think, arises from the large number of resident collectors in that county, and the consequent closeness of observation. I confess, however, that I am now unable to decide between the conflicting arguments.

It seems probable that most of the specimens still at large went into hybernation during the gales which blew early in September, as the latest notices from various counties seem to be September 5th, 8th, 9th, and 14th, but one is recorded from Scotland as late as September 26th; and I have just heard of two more stragglers in Norfolk as late as October 5th and 7th. There is reason to hope, therefore, that many fine specimens are in safe quarters, to re-appear next spring.

Of my own exertions in pursuit of them I have said nothing. It is a painful subject. Suffice it to say that the result of a fortnight, of which every available hour of sunshine was occupied in hunting for them, was that I had seen two specimens, neither of which condescended to come within reach of the net.

Norwich. CHAS. G. BARRETT.

THUNDER-BOLTS.

THE abundance of a fossil is always indicated by its having a popular name, and the reader can hardly travel over any particular geological locality without finding one or more of its characteristic fossils thus occupying a place in popular nomenclature. Not a few are the traditions and scraps of folk-lore that cluster around these ancient relics. Thus, at Whitby, the Liassic *Ammonites* become the snakes which were petrified by "Holy Hilda's" prayers; and the numerous ossicles, or joints, of the stems of a characteristic Encrinite (*Pentacrinus briareus*) are transformed into "St. Cuthbert's Beads" (see Scott's "Marmion"). In Spain, the *Terebratula* is a charm against the cholera, and the fishes' teeth found fossilized in the Miocene beds of Malta go by the name of "Satan's Claws,"—that ubiquitous and evil-disposed individual having torn off his digital extremities whilst vainly endeavouring to climb the cliffs!

But perhaps the geological objects around which most folk-lore and general ignorance exist, are those ancient relics of the secondary rocks known as *Belemnites*, but among the masses better identified as "Thunder-bolts." It is amusing to read the conjectures as to what these objects are, in the pretentious works on natural history of a century ago, when everything was supposed only to have a right to exist in proportion as it was serviceable to man. These *Belemnites* were then supposed to be whales' and crocodiles' teeth, the spines of an extinct hedgehog, &c. They were recommended, in a powdered state, as a sure remedy against *nightmare!* To this day, in some parts of England, they are preserved as an effectual antidote to witchcraft! But by far the most prevalent notion is that these fossils are veritable "Thunder-bolts," and it is astonishing how many people, otherwise well educated, will innocently ask you whether such is their nature. The species from the Lias formation are the largest, and in them one sees the appropriateness of the name *Belemnites*, from the Greek word signifying a dart! (fig. 177).

Fig. 177. *Belemnites hastata*, from the Lias.

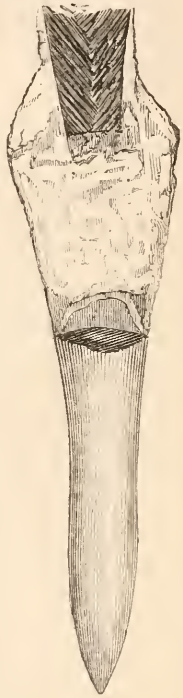


Fig. 178. *B. puzosianus*, from the Oolite, showing upper portion.

Where the Liassic rocks have been broken up and scattered during the Glacial period, as in the boulder clays of Norfolk, these extraneous fossils are tolerably common. Not long ago, during a violent thunderstorm in that county, a bullock was struck dead by lightning, and, on going to the carcass shortly after, one of these large derivative fossils was picked up close by where it was lying. What could be a more effectual proof that these were genuine "thunder-bolts," for here was a bullock struck dead during the thunderstorm, and there was the *Belemnite?* In vain did I attempt to explain—my poor geology had evidently turned my head, for I could not recognise a "thunder-bolt" when I saw one!

These *Belemnites*, or "thunder-bolts," are in reality the terminal bones of extinct species of cuttle-fishes, of which no fewer than a hundred different kinds are known to geologists, from the Lias to the Tertiary beds. They are not found in strata of the latter age, their places being occupied by allied forms more nearly related to existing species. Side by side with the coiled *Ammonites*, the Belemnites roamed the waters of the Oolitic and Cretaceous seas. Unfortunately, little more is usually preserved than the "guards"—the solid parts of the animal we call *Belemnite*. A few specimens which have been unusually well preserved, however, give us a clue to their structure. Thus, *Belemnites puzosianus* (fig. 178) is one of these. The solid part, which is so common amongst us, swelled out into a thin investing, funnel-shaped cavity, in which lay a series of walls, like those which separate the chambers of a nautilus. An air-tube, or *siphuncle*, ran down one side of these chamber-walls and connected them together, exactly as a similar air-tube connects the chambers of fossil and recent species of nautilus. This pile of chamber walls was conical, and is called the *phragmacone*. In fig. 179 a short thick species of *Belemnite* from the Oolite, this phragmacone is seen imbedded in the guard.

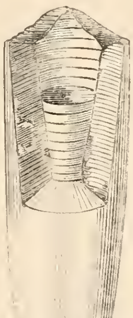
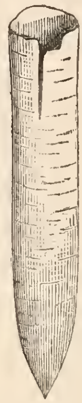


Fig. 179. *Belemnites abbreviatus*, showing *phragmacone* in guard, from Oolite.

Very frequently, however, especially in the species so abundant in the chalk formation, this upper portion of the *Belemnite* is hollow, owing to the delicate nature of the chambers, and where the *Belemnite* has been imbedded in flint nodules (as is very often the case) the carbonate of lime structure has been replaced, and this hollow filled up with silex, as in fig. 180, where the outlines of the original chambers may still be seen. In this form they are well known among the quarrymen and boys as "pinnacles." The "guard" of the *Belemnite*, it will be seen, corresponds to the "mucro" of the ordinary cuttle-bone. The last chamber is rarely preserved. It seems to have thinned off into a kind of horny sheath, and was sufficiently capacious to contain the visceral organs. Over all there perhaps was wrapped a leathery integument, binding head, body, and bony "guard," or *belemnite*, together. These guards vary in appearance very considerably, much of which may have been due to the different stages of growth, or difference of sexes. Sometimes it is scarcely an inch longer than the phragmacone, and at others it may be ten inches.

Fig. 180. Cast of *Phragmacone*, showing chambers, from the chalk.



Fig, 181. *B. mucronatus*, from the chalk.

These ancient cuttle-fishes, or *Belemnites*, appear to have swarmed the seas in perfect shoals, for fragments of Liassic limestone may sometimes be seen thickly entangled with them—to use a figure of poor Hugh Miller's,—"as if a boarding party had hastily thrown down their pikes!" The shallower parts of the sea seem to have been their favourite haunts, and thus far they contrasted with the *Ammonites*, which appear to have loved the deeper and clearer water. The *Belemnites* were doubtless furnished with "ink-bags," like their modern representatives, and thus were enabled to cloud the water with an inky discharge whenever danger threatened. Specimens have been found in which the "guard" had been broken during the lifetime of the animal, and had been repaired by a new growth. But the inexorable limits of space tell us we have said enough to show that the *Belemnites* have no affinity whatever with the hypothetical "Thunder-bolts." J. E. Taylor.

NATURAL HISTORY FOR RUSTICS.

TENNYSON, with that prevision of a future which is at least not destitute of possibility, describes, in "Locksley Hall," how he beheld the agonies and convulsions of nations in the coming age, from which was slowly eliminated the glories of a time of unsurpassed prosperity. There was conflict such as the world never had seen, but it was followed by repose yet more unequalled. The firmament was astir at one time with—

> "the nations' airy navies
> Grappling in the central blue."

This was terrific and lamentable, yet there resulted—

> "the parliament of man,
> The federation of the world."

Something like this is going on in the lesser world of education. We see engaged in dire battles the "powers that be," and also the powers that "have been," and those that hope "yet to be;" every educationist's hand almost is against his fellow, and the skirmishing is so fierce and so confused that the combatants seem to shift their sides; still, one is tempted to believe that out of this crisis will flow an educational era, which, in some degree, may tend to bring about the poet's ideal.

Amongst the multitude of subjects which will be taught to children, when a national plan of education is fairly set to work, we may suppose that Natural History will be found to occupy the place it deserves. That it never has, as yet, been effectively taught to the plastic mind of youth in Britain, either to lords or labourers in embryo, saving in a few accidental instances, can hardly be denied. The knowledge that has been drilled into children. which professed to be natural history, has been a knowledge of names rather than of things; and as repellent as catalogues of kings or geographical lists, still the occasional *pabulum* of those unfortunately placed in the hands of rigid adherents to old methods and ideas. No! let us have "natural history" taught *naturally;* let the pupil work from the knowledge of things, of facts, to the book-lore which names and classifies the objects observed, and elucidates and connects the facts. Beginning early, and working patiently, even amongst what might seem the unhopeful element which a village school ordinarily presents, a teacher being himself or herself well informed as to the main outlines of the different branches of natural history, would achieve results which neither perseverance nor the highest knowledge could bring about on the adult mind. There, granting that a measure of information on some other subjects has been imparted in younger days, the faculty of observation lies mostly in a comatose state, past revival, and the habits which have evolved themselves as the child became the man are only adapted to the somewhat monotonous round of rural life, as it presents itself to the ordinary rustic, whose capacity may be so easily gauged in most cases, and when we test it (at least as far as natural history is concerned) we find that it is as difficult to awaken any liking for it in Sam, who carries the squire's bag while he is shooting partridges, as it is in the humbler Joe, who has ploughed the fields over which the others walk.

Not every one who can teach the rudiments of ordinary school instruction would be able to impart successfully a knowledge of natural history, supposing that he had obtained it in mature years. Let this be granted. To a great extent, the "teachers" must be taught, and this will require time and facilities which are not at present to be had. But would it not be gladdening to the philanthropist, *i.e.* the "man-lover," to see that those who have most to do with Nature, and have, very frequently, opportunities of observing much that the philosopher, coming forth only occasionally from his chamber and his books, is likely to miss—that they, like their father in Paradise, are beginning to name the living creatures around them, and have memories more intent on storing curious facts which have been witnessed than the paltry details of village scandal and spite? Nay, then, perhaps to a great extent, shall the rabid "weekly," reeking with police reports, and sedulous to excite discontent and ill-feeling, be found to have been supplanted by SCIENCE-GOSSIP on the table of the labourer or the mechanic, who will then prefer the sweet breath of Nature to the fumes of the pothouse.

J. R. S. CLIFFORD.

PROPOSED REMEDIES FOR THE POTATO DISEASE.

By W. T. THISELTON DYER, B.A., B.Sc., F.L.S.

IN the last number of SCIENCE-GOSSIP, Mr. Worthington Smith has given a very clear account of the results which up to the present time have been obtained by the investigations of scientific men in England, France, and Germany as to the nature of the potato disease. It will be seen that it leaves very little more still to be worked out; it only remains to consider how far the facts as now understood indicate any probability of some effectual remedy, or, at any rate, plan of prevention, being devised. p. 224

When the disease makes its appearance in a field of potatoes, it seems probable that it originates, in the first instance, at a comparatively small number of centres, from resting spores contained in sets which were infected when they were planted. The *Peronospora*, under these circumstances, grows in the tissues of the potato-plant from below upwards; and when it reaches the surface of the foliage it finally develops, as explained by Mr. Worthington Smith, the motile zoospores by which it is conveyed from one plant to another, till the whole crop is finally more or less destroyed. It is stated, on good authority, that in the neighbourhood of chemical works, potatoes escape with little or no disease. The reason is, no doubt, that the chemical works pour into the air sulphurous acid gas, or some other gaseous impurity which is destructive to the *Peronospora* when it first makes its appearance at the surface of the infected plants, and so stays its further progress. It is well known that lowly-organized plants, such as minute parasitic fungi, are destroyed by applications which, in the case of flowering plants, have little or no effect. Hence, by powdering vines infested with vine-mildew with finely-divided sulphur, which gives off very minute traces of sulphurous acid, we are able to check the mildew without injuring the vine. But in the case of the potato disease, the difficulty is to isolate the affected plants, so as to prevent their zoospores being dispersed even while they are undergoing treatment. Another difficulty is the extreme rapidity with which the infection takes place: the existence of the disease in any particular case may not be observed till it has reached dimensions far beyond the application of remedial measures. Under circumstances such as garden-cultivation, however, where there is an opportunity for closer observation, it would be quite worth while, as recommended by Mr. Poynter, trying the effect of the application of soot to the diseased foliage immediately disease is detected.

It will be seen that in the plants which are attacked secondarily the *Peronospora* progresses from above downwards, which is precisely the opposite of what occurs in those which are attacked primarily. The tubers are consequently not affected till after the haulm. Mr. Parfitt accordingly recommended cutting off the diseased haulm, and Mr. Newmarch, writing in the *Times* of September 2nd, states that he found Mr. Parfitt's plan "perfectly successful in preventing the disease. He describes accurately what I did. With a pair of hand-shears I cut the tops completely off on the first appearance of the disease, strewing earth over the cut stem, and patting it down with a spade to make it air-tight. In rows so treated I never found a diseased potato; but though I triumphed in having beaten the disease, I regret to say that the potatoes were utterly worthless except for seed, or for those who do not mind waxy potatoes and attendant indigestion. Still it is something to secure one's seed for next year." Destroying the haulm prevented the formation of starch in the foliage, and subsequent storing-up, in the tubers; the remedy consequently is hardly better than the disease, except in so far as it arrests its progress.

The Rev. Mr. Moule has started the theory that the potato-plant succumbs to the attacks of the *Peronospora* because it is already in an enfeebled state, from the deficiency of silica in its tissues, owing to the impoverishment with respect to that constituent of the soil on which it is grown. He therefore proposes to use a manure containing water-glass (silicate of soda), which he hopes will give the potato-plant greater vigour, and so enable it to outgrow its parasite. Nothing is lost by trying any proposal of this kind, but it is proper to remark that Mr. Moule has not given any proof of the deficiency of silica in the potato haulm; and there seems no reason to suppose that while cereals can obtain from the same soil a much larger proportion of silica than the potato-plant is ever likely to contain, it will suffer from a deficient supply of that element of its mineral food.

Attention has very reasonably been directed to the inquiry whether it is possible to destroy the resting spores of the *Peronospora* in the sets of the potato before they are planted. The use of various substances destructive to fungoid organisms has been proposed; but they all appear open to the objection that if they are made thoroughly to permeate the tissues of the seed potato, they can hardly fail to injure, or at the best enfeeble, the vitality of the buds, or "eyes," as well. Merely to wash the outside can obviously do nothing towards destroying resting spores, which may be safely out of reach in the interior.

After reviewing all that has been said on the subject, the only direction in which there seems to be any reasonable hope of relief from the injury and anxiety produced by this constantly recurring scourge, is in obtaining and cultivating early-maturing kinds. August is the month in which the potato disease seems to do its worst, especially if the weather be both wet and warm. If the crop can be safely housed before this period, the evil will have been evaded, if it cannot be cured. The production of early kinds is, with the skill and patience which cultivators bring to the systematic improvement of the potato, only a question of time.

MICROSCOPY.

Wood Sections.—I think many cuttings with low powers, and merely to show the general formation, are far better seen as opaque objects than as transparent ones. Some look very beautiful in this way, and more natural; besides, the colour is seen. Nettle root, apple ditto, and clematis canes, are amongst some which are well worth looking at. They must be thin, but not so thin as if used as transparent objects.—*E. T. Scott.*

Hot Water Diatoms.—Dr. Blake has collected more than fifty species of diatoms in a hot spring in Pueblo Valley, Nevada, the temperature of which was 163° F. Nearly all were found identical with the species found in beds of infusorial earth in Utah, described by Ehrenberg, showing that the latter must have been accumulated in a hot lake. No other living species were found in the hot water except red algæ. The deposit was a large one, and contained concretions of silica, the greater part of which was made up of petrified algæ. In one of the hot springs of the Californian Geysers, Dr. Blake also found two species of confervæ, at a temperature of 198° F. In another spring, at a temperature of 174° F., he met with various *Oscillariæ*, the interlacement of whose fibres formed a semi-gelatinous mass. Two species of diatoms were also found in the same place. In the water of the Creek of Geyser Cañon, at a temperature of 112°, the algæ formed layers three inches thick, which covered the bottoms of the pools. The waters are acidulated by the presence of free sulphuric acid, and Dr. Blake thinks that this may account for the rarity of diatoms.

PREPARING SLIDES.—For the benefit of your numerous readers who desire to become acquainted with a clean, ready, and easy method of preparing slides, applicable to fresh cuticles, insects, &c., where heat (as in the case of Canada balsam) is quite inadmissible, I beg to forward you the formula for a medium, discovered and used by myself with great success. Take of clear Dammar resin five drachms; benzine, one fluid ounce. Dissolve without heat. *Modus operandi*:—Place a drop on the slide, put the object upon it, let fall another drop upon the object, and apply the cover. The fluid that escapes, on pressing down, when pressure is necessary, will speedily harden, and the object may be at once examined in any position. In the course of ten days it may be cleaned and placed in the cabinet. Objects prepared for the polariscope are especially brilliant in this medium. An additional advantage possessed by it is, the trifling expense incurred in its preparation.—*Saml. Smith.*

A SINGULAR ROTIFER.—In the last number of the *Quarterly Journal of Microscopical Science*, Dr. Hudson makes known a rotifer, under the name of *Pedalion mira*, having six large appendages like the limbs of a crustacean, terminating in plumose hairs, and worked as locomotive organs by transversely striped muscles attached inside the appendages, which are therefore hollow, and identical in type with the limbs of insects and crustacea. At the same time, the animal possesses a fine ciliated trochal disc, and a gizzard similar to that of other rotifers. Specimens had been supplied to the editor; who confirms the statements of Dr. Hudson in every particular.

ON THE MICROSCOPIC PREPARATION OF INSECTS' EYES.—Good preparations which shall demonstrate clearly the structure of insects' eyes are very much wanted in this country, and, as far as I know, almost impossible to obtain; yet such are comparatively easy to prepare, and, when well made, form objects not only admirable for class demonstration, but are extremely beautiful in themselves. The eye of a large Sphinx moth is most easily prepared; best of all, that of *Acherontia atropos*; but *Sphinx ligustri* will do very well. The moth should be killed and the head placed immediately in absolute alcohol. After it has been in alcohol about a week, it should be taken out, imbedded in a mixture of wax and oil, which should be rather hard, in order to offer plenty of resistance to displacement when the glutinous parts are cut through. The sections should be floated on to slides stained with carmine, heated with absolute alcohol oil of cloves, and mounted in Dammar varnish or Canada balsam. The great thing is to use plenty of absolute alcohol and a thin-edged, hollowed-out razor. If the heads of smaller moths be used, sections very instructive may be prepared, passing through both eyes and the cephalic ganglia. Preparations of the eyes of mollusca, leeches, &c., may be prepared in the same way as those of insects, from specimens hardened in the same manner in absolute alchohol.—*H. N. Moseley, M.A., in Quarterly Microscopic Journal.*

MICROSCOPICAL TROUGHS.—Many microscopists have, no doubt, felt the want of a small trough for use with powers of $\frac{4}{10}$ or $\frac{1}{4}$. I have constructed and used for some two years the one of which I inclose a drawing, and find even a fifth can be used with it, there being no thick glass to obscure the definition of the objective. Should any of your readers not be able to make this themselves, I have given Mr. Crouch a drawing of it, who will, no doubt, be glad to supply them. An ordinary glass

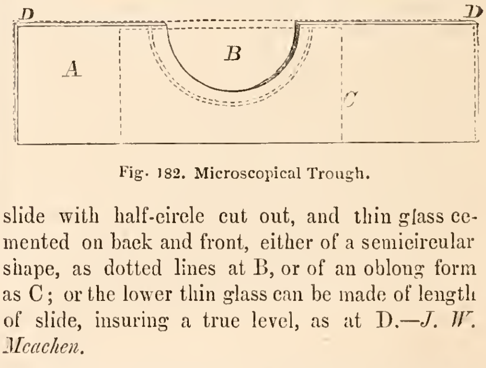


Fig. 182. Microscopical Trough.

slide with half-circle cut out, and thin glass cemented on back and front, either of a semicircular shape, as dotted lines at B, or of an oblong form as C; or the lower thin glass can be made of length of slide, insuring a true level, as at D.—*J. W. Meachen.*

AUDITORY CAPSULES OF MOLLUSCA.—Mr. Fullagar, at a meeting of the East Kent Natural History Society, called the attention of the members to a very beautiful and interesting object, viz.,—the auditory vesicle and its vibrating otolith of *Cyclas cornea*. This beautiful object is very easily found. Mr. Fullagar, after two or three trials, by tearing asunder with needles portions near the base of the creature's foot, succeeded in showing the vesicle and otolith, much to the admiration of the meeting.

VERTEBRATE BLOOD CORPUSCLES.—A number of models have been prepared by Herr J. Klautsch, assistant in the Anatomical Institute of Halle, illustrating the relative dimensions of the red corpuscle in various vertebrata. All the models are prepared to the same scale, viz., five thousand times the natural size. The animals represented are,—musk deer, goat, llama, man, chaffinch, lizard, frog, proteus, and tench. The price of the set, in case, is six thalers.

New Navicula.—The Rev. E. O'Meara exhibited, at the monthly meeting of the Dublin Microscopical Club, the following new Navicula:—*N. dicurvata*, *N. vertebrata*, and *N. Mooreana*.

ZOOLOGY.

Zoological Parallelism.—In making a general survey of the animal kingdom, it is impossible to avoid being struck by the remarkable parallelism which exists between the several orders and families, and even genera and species, that compose the respective classes into which it is divided, and which reveals itself in the representative types that abound throughout its whole extent. Thus if we take the mammalia as our starting-point, we shall find that the carnivora are represented among the birds by the raptores; among the reptiles by the crocodiles and serpents; among the insects by the predaceous beetles, ichneumons, and dragon-flies; among the annulosa by the spiders, crabs, lobsters, &c.; among the mollusks by the cuttle-fish and by some of the gastropods and a few brachiopods; and among the radiates by the sea-urchins, star-fish, sea-anemones, &c. Confining our observation to the parallelism between the mammalia and the birds on the one hand, and the insects on the other, we find that the carnivorous mammals are well represented among the Coleoptera as follows: The Felidæ, the typical carnivora, by the Cicindelidæ, whose resemblance is acknowledged in their vernacular name of "tiger-beetles." The Canidæ—dogs, wolves, foxes—are fitly represented by the Carabidæ; the weasel tribe by the Staphylinidæ; and the hyænas and vultures by the Silphidæ; while the marine carnivora, the seals and whales, find their representatives in the Dytiscidæ and Hydroidæ; and the various species of raptorial birds are no less fittingly typified by the Libellulidæ—ichneumon-flies, sphexes, and the predaceous wasps and hornets; not forgetting the ants, which have a highly-developed carnivorous organization. We need not follow out in detail the obvious resemblances that may be observed between the pachydermatous animals and the Lucanidæ and other dendrophagous insects, as well as between the bovine, equine, and ovine tribes, and the gallinaceous and cursorial birds on the one hand, and part of the Scarabeidæ and Chrysomelidæ, and most of the Orthoptera on the other; or those not less remarkable that exist between the goat, deer, and antelope families, and the Cerambyx, Clytus, and Leptura genera.—*Prof. J. T. Bell, in "Canadian Entomologist."*

Phosphorescence. — Dr. T. L. Phipson has given the name of *Noctilucine* to the peculiar organic substance which is manifested in the phosphorescence of sea-water. This, he thinks, is also the cause of the production of light by the glow-worm, and probably of all phosphorescent animals.

Insects and Plants.—At the meeting of the American Association for the Advancement of Science, recently held at Dubuque, Iowa, a very interesting paper was read by Mr. C. V. Riley, of St. Louis, entitled "Insects shaped by the Needs of Flowers," with especial reference to the fructification of the American Yuccas. Dr. Engleman, of St. Louis, had this year discovered that these plants must need rely on some artificial agency for fertilization. The flowers are peculiarly constructed, so that it is impossible for the pollen to reach the stigma, it being glutinous and expelled from the anthers before the blossoms open. Professor Riley discovered that there was a small white moth that did the work, and demonstrated on the blackboard how wonderfully well the insect was adapted to the purpose. This little moth, which he calls *Pronuba Yuccasella*, has been unknown to entomologists, and forms the type of a new genus. It is most anomalous, from the fact that the female only has the basal joint of the maxillary palpus wonderfully modified into a long prehensile-spined tentacle. With this tentacle she collects the pollen and thrusts it into the stigmatic tube, and after having thus fertilized the flower, she consigns a few eggs to the young fruit, the seeds of which her larvæ feed upon. He stated that the Yucca was the only entomophilous plant known which absolutely depended for fertilization on a single species of insect, and that insect so remarkably modified for the purpose. There was a beautiful adaptation of means to an end, and a mutual interdependence between the plant and animal; and Mr. Riley explained how on Darwinian grounds even this perfect adaptation was doubtless brought about by slow degrees. He alluded, in closing, to a practical phase of the subject. The plant and its fructifier are inseparable under natural conditions, and the latter occurs throughout the native home of the former. In the more northern portions of the United States, and in Europe, where our Yuccas have been introduced and are cultivated for their showy blossoms, the insect does not exist, and consequently the Yuccas never produce seed there. The larva of *Pronuba* eats through the Yucca capsule in which it fed, enters the ground, and hybernates there in an oval silken cocoon. In this stage the insect may easily be sent by mail from one part of the world to another, and our Transatlantic florists may, by introducing it, soon have the satisfaction of seeing their American Yuccas produce seed without any personal effort on their part.

The Golden Eagle (*Aquila chrysäetos*).—According to the *Hants Advertiser* of September 25th, a specimen of this bird was shot at Bowcombe, in the Isle of Wight, in the second week of September. The bird, which had been noticed several times in the locality, was a fine specimen, in good flesh, but was moulting. Outstretched it measured between seven and eight feet from point to point of the wings, and was 3 feet 1 inch long, and weighed 10½ lb.

The French Association for the Advancement of Science.—The first meeting of the above association, closely modelled after that of Britain, was held at Bordeaux, from the 5th to the 12th of September, and seems to have been successful and satisfactory. The citizens of Bordeaux lavished their hospitality upon the members, who well deserved this for inaugurating a movement to spread among that nation a knowledge of and love for science, and thus inform and temper their often misleading enthusiasm; in the words of M. Quatrefages, "to renovate our country by the scientific spirit and scientific studies." The meetings were well attended, both by French and foreign *savans*, though the only two English ones were Professor Odling and Dr. Gladstone. The Society already numbers 800 members, and its finances are in a flourishing condition. The first general meeting was presided over by M. de Quatrefages (the president-elect for next year), in room of M. Claude Bernard, the state of whose health prevented him from attending. The opening address of M. de Quatrefages, as acting president, was a very stirring and noble one, full of sound sense as to the recent humiliation and present condition of France, enthusiasm towards science, and faith in it as one of the most powerful regenerators of the country. "Science is at present supreme," he said; "she is becoming more and more the sovereign of the world;" and he believes that it is only when all ranks and classes of the people, rulers and ruled, are thoroughly imbued with the scientific spirit, and are guided by scientific knowledge, that France will ever again take and maintain the supreme place in the world which she ought to hold. M. de Quatrefages concluded with a graceful allusion to "our elder sister, the British Association."

New Entomological Society.—The entomologists in the neighbourhood of Kensington are zealously endeavouring to form an Entomological Society for that end of London. All entomologists desirous of joining or co-operating are requested to address themselves to Mr. W. Wells, 12, Phillimore Terrace, Kensington.

The Smooth Snake (*Coronella lævis*).—As I am the person referred to in the letter from W. T. P. W. (p. 239) in your last number, I may mention for his satisfaction that no search has been or is being made for specimens of this reptile in this locality. All the captures I have mentioned in the *Zoologist* have been quite casual. It is, however, quite likely that the rapid spread of buildings in this neighbourhood may drive this snake away from Bournemouth as a habitat. In reply to W. G. (same page), he will find a full and excellent description of this snake, together with its various synonyms, in Cooke's "British Reptiles" (Hardwicke), an invaluable little work in that branch of natural history. The description extracted by Fred. F. Warner (p. 232) is rather vague as to points of difference beween this snake and the other two British snakes, and omits, especially, one striking difference; viz. the perfect smoothness of all the scales as opposed to the *carina*, or keel, in all the vipers' scales, and the carination of part of those of the ringed snake. Any one who has been accustomed to seeing the smooth snake would recognize one at a glance, and would not for one instant confound it (I speak of adult specimens) with either of the others; the markings and conformation of the head being very distinct. I have received a second specimen this summer, taken between this place and Christchurch.—*E. B. Kemp Welch.*

BOTANY.

Singular Scabious.—A short time back I found at Folkestone a singular specimen of *Scabiosa columbaria*, a plant very abundant there, nearly all with single stems, but a few branched, generally about eight inches high. The one in question was fourteen inches, having the ordinary single sessile head at the top, immediately beneath which, and apparently springing out from the bottom or root of the head of flowers, were no less than sixteen other single heads of flowers on stalks three inches and a half long, forming, in fact, a perfect umbel, two of the stalks having each a small head of flowers nearly sessile from about the centre of the stalks. The single head was in fruit, while of all the other heads some were in flower, others not quite so much advanced. Six of the stalks had each two short linear sharp-pointed leaves from a little above the centre of the stalk. With the plant grew another the same height, and apparently from the same root, with the ordinary head of flowers in fruit. Folkestone is an interesting spot for the botanist; within a short walk may be found a great variety of plants. The greater part are found close to the walk by the fields between the third Martello tower and the turnpike on the Dover road, and a place called the Warren, close by. At Brighton I last year found three plants of *Centaurea solsticialis*, also a plant that I believed to be *Cachris lævigata;* it was sent to Professor Babington to decide, but after pronouncing it to be a continental plant, and obtaining all particulars as to soil, locality, &c., he took no further notice of it, except that he had lost it.—*T. B. W.*

Potato Disease.—Mr. W. G. Smith, in his paper in Science-Gossip last month, mentions sulphur as a remedy. Last year the disease showed itself about here, and I sprinkled sulphur over the potatoes which were going, and it certainly did them good. The fungus on the leaves at once dried up; but then the difficulty is, when the wind and rain have cleared the sulphur away, to prevent the disease reappearing. I use a solution of sulphuret of lime for my vines, and it keeps *them perfectly* free from mildew; and so I tried syringing the potatoes with it, as the two diseases seem somewhat alike. I am afraid the use of it was delayed too long; but I do not see why it should prove efficacious in one case and not in the other, if it is used soon enough; and the disease really takes its origin from above downwards, and not from the root upward. I always, when I plant, put sand round the potatoes. It is very seldom I have had many diseased, and I may say that it has only shown itself in those potatoes which, when grown, were *not amongst* the sand. This held good this sadly unhealthy year.—*E. T. Scott, Norwich.*

Epipactis latifolia.—The above fine plant, along with *E. purpurata* (*E. ovalis?*) and *Listera ovata*, have recently shown themselves in the gardens of Chace Cottage, Enfield.

Epipactis palustris.—Last month a new station was discovered for the rare orchid *Epipactis palustris*. It grows in the county of Surrey, between Mortlake and Kew. It is strange that so rare, and conspicuous a plant should have been so long undetected in a place traversed by scores of botanists every summer.—*Al. I.*, 28, *Upper Manor Street*, *Chelsea.*

Bee and Fly Orchis (*O. apifera* and *muscifera*).—Within a few miles of Alresford, both these plants may be met with in tolerable abundance. I have hitherto preserved them from the ravages of the spoiler by wisely keeping secret the spots where they are to be found.—*Joseph Anderson, jun.*

Vegetable Hairs.—I have sent a leaf or two of a dry *Myosotis arvensis*, I think, the hairs of which are peculiar, and form an interesting opaque object, which I have not seen described in any work. The hair springs from a bulb, and is surrounded at the base by nine or twelve or more little round balls, which in a good light look like small pearls. —*E. T. Scott.*

"Peloria," or Plant-monstrosity.—*Peloria* is especially interesting, physiologically as well as morphologically. It is also of value in a systematic point of view, as showing how closely the deviations from the ordinary form of one plant represent the ordinary condition of another. Thus, the peloric *Calceolarias* resemble the flowers of *Fabiana;* and De Candolle, comparing the peloric flowers of *Scrophulariaceæ* with those of *Solanaceæ*, concluded that the former natural order was only an habitual alteration from the type of the latter. Peloric flowers of *Papilionaceæ* in this way are indistinguishable from those of *Rosaceæ*. In like manner we may trace an analogy between the normal one-spurred *Delphinium* and the five-spurred Columbine (*Aquilegia*), an analogy strengthened by such a case as that of the five-spurred flower of *Delphinium elatum* described by Godron.—*Masters's "Teratology."*

A Botanical Difficulty.—"E. R. H.'s" botanical difficulty is simply owing to the fact that *Cannabinaceæ* and *Urticaceæ*, or the Hemp and Nettle families (to which may be added *Moraceæ*, or the Fig family), are closely allied natural orders; by some botanists combined under *Urticaceæ*, as one order with sub-orders; by others separated into three orders. This accounts for the apparent discrepancy in the assigned position of *Humulus lupulus.*—*C. S. P. P.*

The Humulus.—"E. R. H." asks to what natural order *Humulus lupulus* and *Cannabis sativus* belong. I have examined the plants, and find that, in the two above mentioned, the ovule is pendulous, and the embryo hooked and without albumen, while in *Urticaceæ* the ovule is erect, and the embryo albuminous and straight. By some authors this is not thought of sufficient importance to separate the order from *Urticaceæ*. It is one of the smallest families, comprising only the two above mentioned, but at the same time one of the most valuable. I think that "E. R. H." will be right if he makes a separate order of them, for, though the difference does not appear great, it is really so.—*Thomas B. Blow.*

Flora of Liverpool.—In our notice of this creditable production of the Liverpool Naturalists' Field Club, we unwittingly gave all the credit to the workers of the last generation. This was entirely due to the modesty of the members, and it is therefore with sincere pleasure we give the names of the most active living workers, some of which will not be strange to our readers. Amongst them are the Rev. H. H. Higgins (president), Messrs. H. S. Fisher, J. Harbord Lewis, F. P. Marral, Heywood Chapman, Robert Brown, Thos. Williams (Ormskirk), F. M. Webb, and Thomas Gibson, as well as those of Mrs. F. Boult and Miss C. Grundy; all of whom have indefatigably and successfully laboured in producing what we hold to be a model local flora.

GEOLOGY.

The Pacific Deep Sea Exploration.—The latest despatch from Professor Agassiz to Professor Pierce, of the United States Coast Survey, is of great scientific interest. It was written on the voyage from Panama to Acapulco, and records the impressions of the author gathered on the Pacific coast, and during a land journey of nearly 300 miles in the Valley of Chillan, between the coast range and the Andian chain from Concepcion, at the mouth of the river Bio Bio, northward to the capital of Chile. This valley, which, commencing at the Gulf of Ancud, extends over 1,500 miles to the north, he finds to be the bed of a vast glacier, whose ice-slide to the north has ground and polished the rocks of its east and west boundaries, the Andes, and the coast-range, so that while they stand they will tell to students the history of one of those wonderful changes which have marked and shaped the earth's surface. At one point, a little south of Santiago, he finds the track of a more recent glacier which, moving laterally from the Andes towards the west, across the drift of the great glacier, has left in its course volcanic boulders in the direction of the coast-range, which stayed its progress. A gradual recession of the ice boundary towards the South Pole, which was accompanied with an ascending temperature, was followed by the formation of successive lakes, whose deposits now form a series of terraces of various levels through the whole length of this interesting valley. An examination of the group of islands called the Galapagos has afforded an opportunity for a study of the land. This archipelago, situated near the equator, 700 miles west of the coast of Ecuador, is evidently of recent volcanic origin. The animals and plants are some of them of types found nowhere else on the known globe, and naturally seem special creations for that locality, or strange instances of the almost creative power of transformation in nature. Evidently the professor inclines to think there has been a direct creation of organized beings for those distant new islands in the wide Pacific, and he confesses that as yet science is unable to answer questions of the origin of organized beings. Small difference is noted in the vegetable products of the Atlantic and Pacific coasts in the neighbourhood of Panama, but in marine animals a decided variation was discovered, while all classes of animal life on both sides bear decided American characteristics. During the long and busy voyage, the party of which Agassiz is the chief have made careful observations of a large class of subjects, and accumulated such a store of specimens as will, in his able hands, make most valuable additions to our knowledge in the sciences of geology and zoology. The exploring party have obtained large numbers of specimens of plants and animals; and Professor Agassiz has already sent home 137 barrels, boxes, and cases filled with specimens.

Geology of North Hampshire.—A capitally-written paper on this subject, by Dr. Joseph Stevens, appears in the "Transactions of the Newbury District Field-Club," which, by the way, has got up its little volume in a most commendable manner. Dr. Stevens's paper includes the extension of the chalk, with an enumeration of its fossils, and, what is still more valuable, a good description of the drift strata, and of the formation of "Pot-holes," &c. The valley gravels occupy a prominent place, as might be expected from so ardent an implement-hunter as the author, whose paper on the "Flint Works at Cissbury," extracted from the Sussex Archæological Society's Collection, just published, will not fail to impress archæologists in favour of Dr. Stevens's knowledge of his subject.

New Dendroid Graptolite.—Mr. John Hopkinson, F.G.S., has just described a new Dendroid Graptolite, from the Arenig rocks, Ramsey Island, South Wales, under the name of *Callograptus radicans*. He thinks this group may have attached themselves to other objects, whereas the true graptolites (grouped by Professor Allmann as *Rhabdophora*) were free. The former, therefore, more nearly resembled the recent sertularians, not only in their mode of growth, but also in their general form, and even in their structure.

Coal.—In a paper read before the American Association for the Advancement of Science, by Professor Andrews, he stated there were three leading varieties of bituminous coal,—the ordinary resinous or caking coal, the splint, and the cannel coal. These pass into each other by almost imperceptible gradations. The resinous coal seems to be the normal condition which the buried vegetation first assumes; the splint and cannel are modified forms, the cannel coal having lost all trace of structure, and containing no organized forms except *Stigmaria*, which is very abundant. The ash of coals is the original inorganic matter of vegetation, often increased by sedimentary matter in the marsh during the formation of coal.

A New Arachnid.—Mr. Henry Woodward, of the British Museum, has given a description of a new species of arachnid, which he names *Architarbus subovalis*, from the ironstone nodules of the Lancashire coal-measures. It is remarkable on account of its close relationship to a North American fossil species. One cannot but note how many of the old forms from the carboniferous formation of North America are common in the same strata in England, under similar conditions of fossilization.

NOTES AND QUERIES.

How to Clear a Pond.—H. B. Rutt won't find his fish so healthy if he were to get rid of the vegetation. The best way to keep it down is to put a number of water snails into the pond, and draw the superfluous vegetation out with a fine hand net or rake, or something of the kind. At least, I find this the best way.—*E. T. Scott.*

The Colours of Lepidoptera, pp. 175, 237.—Mr. Lefroy seems somewhat to have misunderstood the paragraph to which he refers. I did not say the "metallic lustre" of the Papilionidæ was owing to scales of different shades being placed transversely; but that possibly this might be the cause of that "remarkable change of colour" which many exotic specimens exhibit when held in certain lights or positions,—a supposition which examination, however, with the microscope does not substantiate. The question is an interesting one. Perhaps some of the readers of Science-Gossip may be able to account for this burnished appearance, and the change of colour also.—*Joseph Anderson, Junr.*

How does the Spider weave its Web?—In a recent number, I was much interested by reading an article on the Wood Spider and its habits, and it occurred to me that some of your readers might be able to answer me a question which has long puzzled me, and which remains a mystery to me still. I will first describe what I saw, and then ask the question. Two or three years ago, I was walking by the side of a small mill-stream, when my attention was arrested by a very large spider's web stretching across the stream from bank to bank, and attached to the stems of grass and other herbage. The stream was not less than three feet in width, and the web itself would not be less than four, by six feet in length. The web itself was constructed on the mathematical principle, and resembled a cart-wheel in general outline, a number of diverging spokes proceeding from a central point or nave, and these spokes were united by concentric circles of threads about a quarter of an inch apart, over the whole structure. The domicile of the spider was exactly in the centre of the web and over the middle of the stream, and, when I saw it, the spider was hanging by a thread about a foot from the running stream. The spider itself was about the size of a dried marrow-fat pea of the same colour. Now this remarkable sight excited my wonder and curiosity to comprehend how an animal that neither flies, leaps, nor swims, could accomplish such a feat, and I am still in the dark as to its mode of operation in making its web.—*G. C.*

The Squirrel.—I little thought the storm growing out of a mild effort to stay hasty judgment against our little red squirrel could have echoed a murmur across the Atlantic; our cousin, however, will, I trust, excuse me if I doubt the cogency of his evidence. He has never seen, it appears, the little animal in dispute in its native haunts: his observations refer to the grey squirrel, a much larger, and, it would seem, bolder creature,—altogether a different species; and unless we are prepared to accept the Darwinian doctrine, the two can have no common blood in their veins. But they are classed together as squirrels? and analogy should go for something? Well, but, until of late years, men and bats were so classed: Homo sapiens, Homo vespertilio. Will analogy help the hope that men may and will, so soon as the necessity is urgent enough, adopt the charming mode of locomotion of the bat. Elongate their fingers to some ten feet, and grow a web between them, and it is done. Mr. Abbot calls my attention to p. 237, Science-Gossip, 1871, for the purpose of proving that our squirrel should be a match for the pheasant, because his "grey chap" (about the size of a half-grown rabbit) could "bamfoozle" (whatever that may mean) our "pheasant, provided the nest of the bird was in a tree, and on branches that would give the nimble-footed fellow any chance at all to hold on." As, however, our pheasants do not make nests in the branches of trees, I need not trouble you, sir, with any remark upon an event which, in the present state of things, is impossible. I must now bid farewell to our ruddy little friend, only hoping that, wherever the adroitness of his movements may admit of a doubt whether the suspected egg he is carrying may not be a walnut or a chestnut, he may have the benefit of it.—*George Cox.*

Ants.—I have noticed that several of your correspondents have asked for a way to get rid of ants. When in the north of Italy last winter, I noticed one morning that there were a great number of very large ants on the floor of my bedroom, which was on the ground floor. I at once spoke to the proprietor of the hotel about them, and he said he would very soon get rid of them. We found the nest, which was just outside, and he poured about half a pint of petroleum and water in equal quantities into it, and he said I should be troubled no more, for the ants would never go back to the nest. In an hour or two there was not even a stray ant to be seen; and although I remained at the hotel for more than a month, I never saw an ant either enter or leave the nest again. Should any of your correspondents try this method, perhaps they will let you know with what result, a month or two hence. I have no opportunity of trying it myself, as I am not at all troubled with ants in my garden.—*C. E. H.*

Abundance of the Large Heath Butterfly.—In a bad butterfly year like the present, it is agreeable to see even a common species in full force on the wing; and I am glad to record that the Large Heath (*Ephinephile tithonus*) is as plentiful as usual in Kent and Surrey, though rather later than its average in appearing. This is a remarkably tame species, and when fluttering about the bramble bushes, it may easily be caught with the hand. The Large Heath has a habit, like some of the skippers, of turning half round after it has alighted upon a leaf.—*J. R. S. C.*

The Cuckoo in October.—On the 3rd of October,—a day to be remembered in many places by reason of severe hail-storms, thunder, and lightning,—I observed a cuckoo flying into a wood, and it struck me as being very singular to see this visitor so late in the season. I should imagine that the bird does not intend to migrate. Does this denote a mild winter?—*Fred. Anderson.*

Keeping Chrysalids.—In reply to a query by "Mabel Green," as to keeping Chrysalids, I have found the following a good plan:—Procure a strong wooden box,—a convenient size is about 18 inches square; screw two pieces of wood 2 inches wide on the inside of the lid, across the grain, cut out part of the wood between them, and replace with perforated zinc on strong gauze. Fill the box to a depth of 6 inches, as you would a fern-case—viz., about 1½ inch of broken pottery and coarse gravel, the rest with light soil and sand mixed, say two of the former to one of the latter. On the top of the earth place a layer of moss which has been carefully looked over and cleansed of all insects (this may be done by boiling water). The larvæ should be put in this receptacle when full fed; a sprig of the food plant can be put in with them, inserted in a small bottle of water; they will then bury in the earth or spin up amongst the moss. Chrysalids obtained by "digging" may be put in, and lightly covered up with earth and moss. The box may be kept indoors or out, or, what is best, in a greenhouse; but it must not be exposed to much sun, and should be sheltered from an excess of snow and rain, if out of doors. Now comes an important question: some people object to damping their pupæ, but my experience is the other way, and I recommend watering the top of the moss with a fine-rosed watering-pot about once a week; the moss will hold the water and create sufficient moisture to dampen the earth, and the coarse material at the bottom will insure any excess of moisture draining off. If any mould be observed, it will be due to flies, dead pupæ, or larvæ, which should be carefully removed. Of course, great judgment must be used in damping. It is well to examine the earth before watering; it should never be allowed to become dry and caked, or, on the other hand, to be wet. It is a good plan to rear all larvæ in a cage of this description, using small bottles for the food plants; the cover may then be made arched, or gabled, by means of splints covered with strong gauze. (The jam-pots can still be used for very young larvæ.) It will, however, be necessary to remove carefully from time to time anything likely to engender mould. I can recommend the above as a simple, economical, and successful "breeding-cage." Of course, various improvements may suggest themselves, in the shape of side openings or doors, but they all entail expense, and are conveniences rather than necessaries. I should be glad to know the experience of other entomologists on this subject.—*H. Miller, Ipswich.*

Chrysalids.—In answer to your correspondent Mabel Green, I beg leave to inform her that for three years I have used a mixture of cocoa-nut fibre and silver sand in which to keep my chrysalides. I find it vastly superior to mould, moss, &c., as it retains its moisture longer. When the caterpillar is about to change, I place it in a covered box containing some fibre and sand, slightly moistened. It will almost immediately retire below the surface, and there change.—*T. W. Harris, Junr.*

Keeping Caterpillars.—In reply to query on this subject (p. 237), I strongly advise Miss Mabel Green to procure the Rev. J. Greene's "Insect Hunters' Companion" (Van Voorst), second edition, which is an exhaustive manual on the subject of collecting and rearing from the egg to the imago. It would be impossible to give, in one short paragraph, advice applicable to the rearing of all larvæ, as different species require different treatment.—*E. B. Kemp Welch, Bournemouth.*

Caterpillars.—The following might be of nterest to your readers. I put a caterpillar into a tin coleoptera box lined with cork. On opening the box a day or so afterwards, instead of the caterpillar there was on one side a little heap of cork thrown up. I let it remain thus for some time, and the other day cut round the edge of the oval mound with a penknife. The cork had been completely eaten out by the caterpillar, and over the hole it formed a perfect shell or cocoon, to protect the chrysalis; which at present lies in the dormant state.—*W. S. Palmer.*

Dock *v.* Nettle.—In reply to "G. H. H." (p. 238), I shall probably form one of a numerous batch of respondents; but I can certainly testify from long experience to the fact that the juice of the dock, if applied while the sting is recent, immediately allays the irritation. In fact, when nettle-stung, I invariably look for a dock, as I suffer more from irritation thereafter than most people, and have never failed to find relief from the application. I imagine the *modus operandi* to be chemical; the result of the oxalate of potass in the dock reacting on the poison in the nettle hairs. In connection with this subject, it may be worth mentioning to any of your readers who suffer from the hairs of urticating caterpillars, that sweet oil rubbed in affords immediate relief.—*E. B. Kemp Welch, Bournemouth.*

Dock v. Nettle.—In reply to "G. H. H.," I think there is little doubt as to the efficacy of the juice of the dock in soothing pain caused by the sting of a nettle, the poison of the sting being *alkaline*, and the juice an *acid*. It is a singular fact in nature, that the property of the poison of the sting of a bee or wasp is antidotal to that of the nettle, and *vice versâ*, the poison of the sting of the former being an *acid*.—*Jas. Pearson.*

A Nest in a Chignon.—The other day I observed a curious object in a hedge, and on close inspection found it to be the nest of a field-mouse, comfortably inclosed in the remains of what had once been a very fair head of hair, with the flax stuffing to denote its former use. I thought the ladies might be interested to learn that even a discarded chignon does not cease to be of use.—*W. H. Crawley.*

Phosphorescence.—On Friday evening, August 30th, we witnessed a very curious phenomenon. Between 9 and 10 o'clock we started for a walk along the sands between Towyn and Aberdovey, on the coast of Merionethshire. The two places are distant about four miles, and along the whole space between them is a broad expanse of beautifully smooth and hard sand. The night was dark, and there was a good breeze blowing from the sea (the west). Soon after starting, one of our number noticed what were for the moment considered to be sparks of fire in the sand; but a closer examination showed that at every step we took, the sand around the foot became suddenly illuminated with a phosphorescent light just at the moment the foot was planted on the sand, but in almost every instance the light faded away immediately the pressure was removed. The tide had turned about two hours and a half, but we noticed the phosphorescence for the whole distance from high-water mark down to the edge of the sea. On bending down to look closely at the sand, the light appeared to be produced by innumerable little luminous specks. Where the sand was covered with a layer of water, we noticed this luminosity, as well as where it was comparatively dry. In some places, the light appeared to a distance of twelve or fourteen inches around the foot, while in others it was very slight. The sand was quite dark until trodden upon or disturbed in some other way; and we observed no luminosity at all at the time on the water. Occasionally, a piece of seaweed was disturbed, which showed its whole length by the phosphorescent glow which was immediately produced. On taking up the seaweed, the glow became most intense, and on passing the weed between the fingers, the glow became attached to them, and a strong smell of phosphorus was unmistakably perceived. The phosphorescent glow was seen most brightly where there were lines of foam left by the tide. When the foam was disturbed, the whole became brilliant immediately. The light was not seen on any seaweed but the *Chorda filum*; the *Fucus vesiculosus* and sertularias did not exhibit the phenomenon. Several flashes of lightning were observed at the time in the west, but we heard no thunder. Is not this phosphorescence on the sand an unfrequent occurrence? Can you give me any information about it?—*A. B. C., Croydon.*

Birds Imitating Sounds.—I do not know whether naturalists have made the extent to which small birds have the power of imitating sounds foreign to their own natural notes, a subject of investigation. Bullfinches, we know, can whistle elaborate tunes: their voice organs must be wonderfully flexible, their ear extremely sensitive, and their intuitiveness of memory such as also to suggest a development of brain beyond the phenomena of mere instinct. Canaries whistle tunes, and I was told the other day of a sparrow which had been taught by a lady to sing in a manner totally different and far superior to its natural style. Many years ago, I was staying with my sister in a lodging a few miles out of London. Soon after we were settled in, we were rather annoyed by hearing a clock outside our door continually striking; it was quite regardless of the true time, and sometimes went on for several minutes together, but the moment we opened our door there was silence. Our curiosity was excited, and we inquired of our landlady what it meant, as there certainly was no clock within our precincts. The mystery was soon solved: on the window-seat outside our door was a large cage containing several canaries; one of them had been hung in a cage during the previous winter (it was now May) near the clock in the kitchen, and had learned to imitate the strike so exactly, that it was impossible to distinguish the performance of the machine from that of the little mimic.—*A. L.*

Vanessa Antiopa.—I am pleased to see that several captures (most in the eastern counties) of this rare British insect have occurred lately. Although reported exceedingly abundant on the continent, so far as my experience in 1868 and 1870 went, I should take it to be by no means of such common occurrence there as Machaon, Podulirius, Hyale, Lathonia, Io, or Atalanta. It would be interesting to note if, in the corresponding years during which it has favoured Great Britain with "putting in an appearance," it has been more than usually abundant in France, Germany, or Switzerland. I heard last week from my sister, Miss Evelyn Melvill, that she had captured several specimens in a garden at Coblenz. This place was the centre of my entomological observations in the two years I have mentioned, when the species was most conspicuous by its absence. All this leads me, and not without reason, to surmise that Antiopa is more than usually frequent this year in Europe. I noticed, when in America this year, that this species was common about Boston and New York: it is not called there the Camberwell Beauty, but the "Mourning Widow." In Germany it goes by the name of der Trauermantel, the Mourning Cloak.—*J. Cosmo Melvill.*

Ants.—Can any of the readers of Science-Gossip account for the swarms of ants that this year infest the hotels and houses on the coast of Kent and Sussex? They are so minute, that but for their rapid movements one cannot without a magnifying-glass detect them. They enter every crack or hiding-place, and attack bread, fruit, &c., by hundreds. I am told, at Mutton's, the confectioneer at Brighton, that they kill and eat beetles when found on their backs and left at their mercy;—they even enter trunks, boxes, &c.—*T. B. W.*

Missel-Thrush *versus* Squirrel.—As counsel for the defendant in the above case, which first appeared in the columns of Science-Gossip more than twelve months ago, I feel bound to say a few more words on behalf of my old client, as the charge has been renewed against a relation of his on the other side of the Atlantic, who is apparently possessed of more than even Yankee 'cuteness. Turning over the pages of "Waterton's Essays" (than which I know no higher authority in natural history), I came upon the following remark:—"Mr. Wighton's squirrels will consume carnal food in confinement, whilst mine in liberty are never known to touch it." I was very glad to meet with this, as so far it confirms my opinion. Now I wish one of the upholders of the flesh-devouring theory would be so kind as to answer the following question in language that can be easily understood by us ignorant unbelieving blockheads:—How can an English squirrel climb a tree and carry a pheasant's egg at the same time? When this has been satisfactorily accomplished, I will cry *peccavi.*—*H. C. Sargent.*

An Optical Phenomenon.—Under this head, in the September number, was a very remarkable statement, which reminds me of a much commoner phenomenon noticed, I suppose, by many, but never very satisfactorily accounted for. I allude to the border of light seen round a person's shadow on the grass when the dew is heavy and the morning sun is bright. It will be best seen on the grass, but may be noticed also on the roadside hedges when the observer is riding or walking quickly along the road. The general explanation is that it is simply an illusion produced by the strong contrast of light and shade; but all who will observe carefully will agree that it is something more than contrast. It may be in the recollection of some of your readers that the subject is touched upon in Sir Emerson Tennent's book on Ceylon. In that island the dew is dense and the sun intensely bright; and every moving shadow on the grass has a strongly illuminated border, to such an extent, indeed, that it is supposed to have suggested the halo which is depicted round the Cingalese idols. The phenomenon I speak of, like the more remarkable one noticed by your correspondent, is no doubt due to refraction, but it is never noticed in works on optics.—*W. L. Bell, M.A.*

Whitebait.—Can any of the readers of Science-Gossip inform me if Whitebait is a distinct species (*Clupea alba*), or is it the young or fry of the Herring (*C. harengus*)? Some ichthyologists state that the tiny fish termed Whitebait is simply the fry of the Herring.—*C. J. Lathbury, Worcester.*

NOTICES TO CORRESPONDENTS.

W. Mawe.—The facts you record are well known to entomologists. See Newman's "Butterflies" on the phenomena of hybernation.

S. S.—Your notice of *Spiranthes* never came to hand.

L. O. F. R.—It is a common thing for the Lias fossils to be incrusted with pyrites, but there is no means of removing the latter without injuring the fossils.

P. Barlow.—The "Micrographic Dictionary," now publishing in half-crown parts, would meet all your wants, as it gives a full and detailed account of each microscopical object.

E. Lovett.—The so-called gall is better known as "Oak-button." It is formed by one of the Cynipidæ, called *Neurobius Reaumuri*. See S.-G. for November, 1866.

J. W.—The Oak-leaf fungus is *Uredo Quercûs*. That on the Veronica leaf appears to be *U. confluens*.

T. B. W.—Very curious. See Master's "Teratology" for similar freaks. Please send the paper you mention to us.

E. M. P.—Your pest appears to be the Red House-ant (*Diplorhoptrum molesta*). It is anything but a rare visitor in London, Hastings, and Brighton. For full description see an article by W. E. Shuckard, in Science-Gossip for December, 1866. The species has undoubtedly been introduced from South America.

E. T. S.—Your specimen of Geranium fungus has unfortunately been mislaid. Send another.

R. Blight.—The Star-thistle Centaurea (*Centaurea calcitrapa*).

J. B.—The fungus is *A. statice*; it is not uncommon on the Dandelion.

H. L. G.—You are right in your surmise. The plant sent is the Autumnal Gentian (*Gentiana amarella*).

J. H. G.—The plant you describe corresponds with *Chærophyllum temulentum*, or "Rough Chervil."—*J. H.*

H. C. S.—Your bird is doubtless the Little Grebe, or Dabchick (*Podiceps minor*).

Fungi. M. Browning, Hastings.—Fungus sent is *Boletus subtomentosus*. Giant Puff-ball. Cut in slices half-inch thick to fry in egg for ten minutes.—*W. G. S.*

J. H. M.—You had better send us the extract to look over, as well as cuts, &c.

J. A. G.—Please leave a specimen at 192, Piccadilly.

E. H.—Accepted. Will appear next month.

M. D. Berksford.—In the reply last month, instead of *B. univalvum*, read *B. curvatum*.

H. F. E.—The ferns inclosed are the Black Spleenwort (*Asplenium adiantum-nigrum*). Your variety of Hart's-tongue is doubtless that of *multifidum*.

E. C. J.—No letters relating to exchange of zoophytes have been sent to us for you. Answer as to zoophytes next month.

E. W.—No. 1 is *E. parviflora*; No. 2, *E. angustifolia*.

A. E. M.—The shell is *Mactra stultorum*.

J. Sargent, Jun.—The insect was probably *Lepisma saccharina*; but it came utterly smashed. Our querists cannot take too much trouble in inclosing specimens. It is too great a temptation to the Post-office officials to resist smashing anything marked "with care!"

J. M. Newland.—The specimen was the Small Earwig (*Labia minor*).

The Fungus with black stalks seems to be a barren form of *Thamnomyces hippotrichioides*.—*W. G. S.*

EXCHANGES.

Well-mounted slides of diatoms, &c., for unmounted and unprepared diatomaceous earths. Names required. N.B. Except Toomebridge.—H. B. Thomas, 13, Market-place, Boston.

Three varieties of *Actinia*, an eleven-rayed Star-fish, and sundry other specimens, in exchange for any others suitable for a small marine tank.—A. E. Allinson, Lynn, Norfolk.

Crystals for Polariscope.—A variety offered in exchange for other well-mounted slides.—Send list to Alfred Allen, Felstead, Essex.

British Land and Fresh-water Shells, named and localities given, in exchange for British Birds' Eggs, with names, &c.—Address with lists, H. Perkins, Sibford, near Banbury, Oxon.

Spicules of *Halichondria sanguinea* and *Grantia botryoides* for other good mounted objects.—J. C. Hutcheson, 8, Lansdowne Crescent, Glasgow.

Wanted, in exchange for a good unmounted object, a good specimen of *Actinocyclus Ralfsii*, well mounted in balsam.—Send stamped box or envelope, with the object, to W. Sargant, Jun., Caverswall, Cheadle, Staffordshire.

North American *Coleoptera* in exchange for any other.—Address W. V. Andrew, No. 117, Broadway, New York, U.S.

British Lepidoptera in exchange for other British; Northern specimens wanted.—A. H. S., 50, Arlington Street, Mornington Crescent, London.

For testa of Star Anise-seed send stamped directed envelope and object to John H. Martin, 86, Week-st., Maidstone.

Larvæ of Oak Eggar (*Lasiocampa quercûs*), and Pupæ of Privet Sphinx (*S. ligustri*), for good microscopic slides.—John Woodland, The Parks, Minehead, Taunton.

For hair of Guanaco send stamped envelope to Isaac Wheatley, Malling Street, Lewes. Any microscopic object acceptable.

Eggs of Kingfisher, Cuckoo, Quail, Spotted Sandpiper. Stone Curlew, Long-eared Owl, Bernicle Goose, Night-jar, and Red Grouse, &c., for other good eggs. Sea-birds' especially wanted. Unaccepted offers not answered.—J. Anderson, Alresford, Hants.

British Ferns and their vars. for others, British or Foreign.—J. Bowman, Cockan Lamplugh, Cockermouth.

Lepidoptera, British Land and Fluviatile Shells. Fossils, and Minerals, in exchange for Foreign or rare British shells, or fossils. Lists sent and required.—M. M., Post Office, Faversham, Kent.

Good slides for Mole Crickets, Locusts, Great Cockroach (*Blatta gigas*), the harmless Wake Beetle (*Hydrŏus piceus*).—C. L. Jackson, Clarendon Terrace, Bolton.

Wanted, growing plant of Bardfield Oxlip (*Primula elatior*, Jacq.). Growing plant of *Pulmonaria angustifolia* offered in exchange.—F. J. Warner, 3, Clifton Terrace, Winchester.

Wanted to exchange, Forfarshire Mosses for the mosses of any other locality.—W. M. Ogilvie, Lochee, near Dundee.

For a little seaweed rich with *Grammatophora marina* and *Rhabdonema arcuatum*, send stamped and directed envelope to William Swinburn, 36, West Straud, Whitehaven, Cumberland.

Silken Cocoons of *Liparis auriflua* and *Odonestis potatoria*, and other entomological slides for exchange.—Address, E. Lovett, Holly Mount, Croydon.

Wanted, Lias and Oolitic Fossils in exchange for Mountain Limestone species.—J. Harker, Richmond, Yorkshire.

For Hair of Mole, Fox, and American Squirrel send stamped directed envelope and object of microscopical interest to R. L. Kay, Cathnor Road, New Road, Shepherd's Bush, W.

Sporangia of *Polypodium nerifolium* and *Nephrodium molle-cristatum* for good objects and stamped envelope.—W. B. Marshall, 16, Chaucer Street, Nottingham.

A Collection of Fossils, comprising specimens from almost all the formations, for a student's microscope.—Rough lists on application to F. Stanley, Infirmary, Margate.

Plants from Ben Lawers, &c., in exchange for rare plants.—W. R. Hayward, Devonshire Road, Forest Hill, S.E.

L. Sybilla, *V. polychloros*, *H. Semele*, *C. ligniperda*, *N. cerasa*, *C. duplaris*, *A. Aprilina*, &c. &c., in exchange for British or Foreign Lepidoptera, Coleoptera, or Microscopic slides.—Joseph Anderson, Jun., Alresford, Hants.

BOOKS RECEIVED.

"The Canadian Naturalist." No. 4.

"The Yorkshire Naturalists' Recorder." Nos. 1, 2, and 3.

"The Boston Journal of Chemistry." No. 3, vol. vii.

"Land and Water."

"The Vegetable World." By L. Figuier. New and revised edition. London: Cassell & Co.

Lindley and Hutton's "Fossil Flora of Great Britain." Vol. i. New edit., edited by W. Carruthers, F.R.S., London.

"Town Geology." By Canon Kingsley. London: Strahan & Co.

"Introduction to Study of Biology." By Professor Nicholson. London and Edinburgh: Blackwood & Son.

"Canadian Entomologist." No. 8.

"Popular Science Review," October. London: Hardwicke.

"Proceedings of the Bristol Naturalists' Society," 1872. January to May.

Deschamel's "Natural Philosophy." By Professor Everett. Part IV. "Sound and Heat." London: Blackie & Son.

"The Flint-works at Cissbury." By Dr. J. Stevens.

"Geological Notices of North Hampshire." By Dr. Joseph Stevens.

"Memoirs of the Geological Survey." Vol. iv. "The Geology of the London Basin." Part 1. "The Chalk and Eocene Beds of the Southern and Western Tracts." By W. Whitaker, B.A., F.G.S. London, 1872.

Communications Received up to 12th Oct.—T. B. B.—C. L. J.—T. B. W.—E. B. F.—A. M.—J. C. M.—J. W.—J. W. B.—H. L. G.—J. B.—C. S. P. P.—J. H.—W. V. A.—A. H. S.—W. S.—H. E. S.—H. H.—M. B. M.—G. C.—C. E. H.—C. R.—J. C. H.—A. A.—H. P.—T. A.—T. P.—W. M.—S. S.—A. E. A.—W. W.—J. M. N.—F. J. W.—L. F. R.—P. B.—T. B. W.—E. T. S.—C. C. A.—W. G. S.—A. 1.—H. B. T.—R. H. N. B.—H. A. L.—J. P.—E. M.—J. H. M.—J. A. H.—I. W.—J. J. M.—F. J. W.—E. B. K.—E. L.—W. G.—E. T. S. W. M. G.—J. A., Jun.—H. W.—J. W.—E. H.—R. H.—H. F. E.—J. B.—W. H. C.—E. C. L.—J. P.—F. A.—H. B. G.—W. H. W.—A. H. S.—A. F.—E. W.—W. R. W.—F. S.—W. B. M.—H. L. K.—W. B.—W. L. N.—L. S.—A. E. M.—A. L.—B. J. A.—E. M. F.—E. E.—E. W., &c.

COLLECTING AND PRESERVING.

No. XI.—LAND AND FRESH-WATER SHELLS, &c.

By Ralph Tate, Assoc. Lin. Soc., F.G.S., &c.

A YOUNG friend, desirous of entering upon one of the most accessible natural history pursuits—that of the study of Land and Freshwater Molluscs, begged of me some practical hints on the collection and preservation of these objects of our woodlands, waysides, and water-courses. Believing that this kind of work offers a good stepping-stone to the study of Nature it its more extended forms and complicated relations, I was most anxious to help my tyro naturalist, and that beyond his utmost expectations, as I made a few initiatory trips with him in a search for the coveted treasures.

Our equipment was simple and inexpensive, consisting of a block-tin saucepan finely perforated at the bottom, about six inches across, and having a hollow handle of a size to receive firmly the end of a common walking-stick—such a *dredge* or a *sifter* will cost ninepence or a shilling at a tinman's; secondly, of a pocket lens; and lastly, of a variety of boxes, and a bag to contain specimens of different sizes. Thus provided, our first excursion had for its object an examination of certain neighbouring ponds and streams. My pupil, guessing the use of the perforated saucepan, makes his way to the nearest pond, fixes the improvised handle, dashes in the *sifter* with impatient ardour, and having brought up a quanity of mud from the bottom, looked upon the oozy mass with despair. Patience, my lad! Remember that the pleasure of success in science is the higher, the greater the labour expended in obtaining the objects of our search. Expect failure now and again, but do not be disheartened: "*Ohne hast, ohne rast,*" should be the motto of every naturalist. Now, shake the tin in the water, keeping its rim just out of the water, dipping it down now and then. That is well; thus you see that you have cleared off the mud, and what you want is probably left behind along with the rubbish. What, nothing! Come, try again; but this time scrape the sifter along the surface of the mud, and I am confident that you will find something to reward you, and with much less trouble and display of temper. In this way, after repeated trials, a number of shells were secured and transferred to the boxes. Then, after the first gush of excitement is over, we retire to an adjoining bank to con over the spoils, and I to make mention of the various habits of freshwater snails, and consequently of the different modes of search. My young friend's enthusiasm is aroused by the mention that a few large mussel-like shells are inhabitants of our fresh waters, and great is his haste to be up and again doing, in the hope of adding some of them to his stock. But in vain were his many attempts to find them in the pond which had already yielded us such a variety. Do they live here? is at last the anxious question. No; but let us away to yon sluggish brook, for it is in such that we may expect to meet with them. Now I see them; are those not their ends just peeping above the mud? And full of eagerness he dashes in the dredge, but with little result, excepting that of a dead shell or two. Oh! how can I get them? Shall I take off my shoes and socks and wade for them? Well, you might secure them that way, and sometimes it is the only way, but on this occasion I do not think it necessary. Come, we will move a little higher up, where the stream is clear, and the shell-fish undisturbed. Observe the gaping ends of the shell, and thus I push the end of this stout rod between the partially-open valves; now they close upon the stick, and so we bring our prize holding on to the stick to the bank.

"You will recollect (addressing my companion) that in the muddy pond we have just left we chiefly got small bivalves and only a few snail shells. I have already told you that water-shells differ much in their habits, and that consequently our search for any particular species, or set of species, can only be successfully carried on when that knowledge is our guide. Those little bivalves, and a few of the snails that we have gathered, habitually live at the bottom, and will of course be brought up in the dredge when that implement is dragged over it; but there are many shells which live at or near the surface, and which feed on the submerged and floating plants. Therefore we must seek out a weedy pool if we would increase the variety of our collection." Such a one is reached. And the dredge brought into requisition, anon to snatch up a floating snail, again to sweep it over and through the plants, varying our occupation by dragging to the margin the tangled masses of weeds; by all of which means a considerable number of the class of air-breathing water-snails were obtained—admonishing my young friend that this last plan does very well when the plants grow in dense masses, because when thus interlaced they form a natural net to catch those snails which on the slightest disturbance lose their hold upon the weeds, and which would otherwise fall to the bottom.

Yet another plan remains to be pursued, one by which the few small shells hiding among the roots of the plants may be secured. Obviously the dredge misses such; but by pulling up the plants by their roots, and well shaking them in the half-sunken sifter, we yet after all obtain them.

From causes which need not be explained here, the shells living in some ponds are all much eroded, or coated with a ferruginous deposit; it will be desirable therefore to find out the localities where specimens are in the best condition, so that you may have typical specimens for comparison before an extensive collection is made.

Our experience is that though a considerable number of species may be obtained from a ditch or pond, yet a few are found as the sole molluscan tenants of particular sheets of water; that lakes exhibit a dearth of life, and that the greatest variety is often to be met with in canals; but should a search be carried on in them, avoid the tow-path side, for reasons that a little thought will find ready solution.

Living near the sea, and within a short distance of wooded hill-sides, we had within a limited area such a variety of physical features that had led us to infer the existence of a rich molluscan fauna for the neighbourhood. Our second excursion was devoted to a search for snails along the sea margin and shores of the estuary. Proceeding along the low sand-dunes—at first sight a most uninteresting spot—*Helix caperata*, *H. virgata*, *Bulimus acutus*, and a few other snails, were found clustering upon the low, stunted vegetation, in such numbers that handfuls might have been gathered within an area of a few square feet. Leaving the sea-shore, our way led us over the fore-shore of the mouth of the river, crushing under our feet at every step shells of *Cardium edule*, *Scrobicularia piperata*, and a few other bivalves which find a congenial habitat in such situations. Gaining the muddy margins of the higher part of the estuary, *Conovulus* was looked for, and found under the stones along the high-water mark. Higher up the river the rejectamentum on its banks was carefully turned over; and we were successful in securing a number of land shells. The animals, of course, do not live in such places; but their empty shells, which only were found, had been brought down from the land surface by the agency of the streams and tributaries of the river. Nevertheless such an *omnium gatherum* should demand attention, as its contents give an insight into the character of the land and freshwater forms within the area of drainage of the river.

The number of estuarine species which have a place in our works devoted to British land and freshwater snails is very few, and the majority, moreover, are confined to the margins of the tidal rivers in the South of England. Thus *Assiminea Grayana*, *Hydrobia ventrosa*, and *H. similis*, live on the mud banks beneath the shade of sedges and rushes, skirting the Thames below Greenwich. To gather these small shells singly is a tedious operation; but if a thin piece of flat wood, or other substitute as the ingenuity of the collector suggests, be used to scrape lightly over the surface of mud, transferring the mass to the *dredger*, and washing in water, a number of specimens sufficient to stock every private cabinet in the country may be obtained in a short space of time.

For the third initiatory excursion our steps were directed inland, and as we proceed the hedgerows, mossy banks, and margins of water-courses were diligently searched; finding a *Helix* here, a *Pupa* or a *Succinea* there. Gaining the woods, we turn over the damp leaves; grub under the clumps of ferns and wood-rushes for small Helices, Pupæ, and the like; scan the trunks of the trees, for the climbing *Clausiliæ*, *Bulimi*, and *Helices*, not unmindful that each little dirt-like mass is probably a *Bulimus obscurus*, which, by covering its shell with mud, thus exhibits a protective faculty, and often escapes detection. Raise the rotting bark for *Balea*; lift the stones at our feet, or roll away a log for *Helicella*, and other small shells which usually live in such situations.

From all this we learn that each species affects certain stations, and therefore, with the knowledge of the circumstances in which they are found, we may set out with some definite idea as to what we are likely to meet with; and in consequence when to collect, and where to collect, are regulated by the unvarying habits of the objects of our search.

Now, a large portion of the life of most land snails is passed in a state of sleep. Those living in open situations are inactive during the heat of a summer's day, and when there is continued drought; but on the first shower, or after the fall of dew at night, they recover and move about in search of food. Cold acts much in the same respects as heat, and with the fall of the leaf they retire to winter quarters in crannies of rocks, crevices of walls, under heaps of decaying vegetation, &c., or bury themselves in the soil, there to hybernate till the genial showers of spring awaken them.

The best time of the year for collecting is in the autumn, when the shells are full-grown. Those collected in spring have lost much of their original beauty by exposure to the rains and cold of the winter months.

As regards the particular time of day to collect with advantage, it has already been implied that a search in an open country should be prosecuted after a shower of rain, or during early morn. In damp woods, where throughout the day the air is sufficiently moist to maintain the animals in full activity, no such considerations determine the best time for collecting. In such places, light is usually the desideratum, and, consequently, I have found that search conducted at mid-day in a clear sky has been amply rewarded.

Land snails exhibit a partiality for calcareous soils, not only by those living on downs and hill-sides, but also by the woodland species.

Having spent the forenoons of three days in gathering slugs and snails as before detailed, one evening was devoted to the preparation of the specimens for the cabinet.

The first step was to remove the animals, and, as all know, it is neither an easy nor a cleanly task to separate the living snail and its house; but kill your snail, and, the muscular connection with the shell being severed, its whole body is readily taken out by means of a pin—why, it is just like picking periwinkles; and if the proclivities of our childhood's days are not entirely obliterated, cleaning out larger snails from their shells will be a task requiring no teaching. But, with regard to the smaller kind, it is another matter, and it will be my duty to show you how to set about the work.

Now pick out those shells, the apertures of which are wide enough, as it seems to you, to permit the removal of the dead body of the snail by a pin. You may also place with them the larger bivalves. All these we will boil to kill the animals; then strain off the water, and wash with cold water. By this means the bodies contract, and being firmer, are not so liable to be broken in the process of removal. Shake the water out of the empty shells, and place them before the fire to dry; do not rub them, but particles of dirt may be gently flicked off by the aid of a camel-hair brush. Thus we treat the larger snails. Now for the mussels. Doubtlessly most of the dead bodies will have fallen out between the open valves while in the water; should any remain, a slight shaking of the shell held by the hand in the water will remove the contained body. Taken from the water, the valves gape widely; dry the inside and outside with a cloth, and having tape or cotton at hand, close the valves by the pressure of the thumb and fingers of the one hand, and with the end of the thread between your teeth, wind the thread two or three times around the shell with the other; now tie the thread as tight as you can. Yes, I have done so, but still the valves are not closed. True, this is because of the elasticity of thread. If, however, you will take the precaution to wet the thread before tying, you will find that the tie is more secure, and that there is less difficulty in making the second knot.

With patience and a little skill, bivalves as small as *Cyclas cornea* may be treated in this way. But the smaller *Pisidiums*, and some of the minute snails, as *Carychium minimum*, may be prepared for the cabinet by gently drying them in sand; too great a heat causes a transfusion of the carbonaceous matter of the animal into the substance of the shell, which is thereby discoloured.

There still remain for treatment such shells as *Clausilia*, *Bulimus*, *Helicella*, some Helices, &c., the animals of which retreat, on the least irritation, beyond the reach of a pin, and whose shells, indeed, will hardly bear the rough handling almost necessary when a pin is used. Their bodies might be dried within the shells, but if it be possible to remove some portion only of the animal, an attempt should be made to do so.

Land snails, when placed in water, do their best to effect an escape from a medium so fatal to them; their efforts are usually exhibited by stretching out their bodies to the utmost, swaying them to and fro as if in search of a foothold. Taking advantage of this propensity, the snails should be immersed in tepid water, because the majority, after a day or two's confinement in the collecting-boxes, will be in a dormant condition, and warm water has a greater resuscitating effect than cold. When all the snails are struggling to find a way out of their unpleasant situation, gradually add hot water so as to kill or paralyze them while in an extended state. They may now be thrown into boiling water, the better to relax the muscular attachments, and the bodies, or so much as will come away, dragged out by forceps or a pin passed through the foot. The shells may now be dried in sand as before mentioned.

In cleaning the shells of some species, great care is needed, so as not to remove the hairs or bristles which clothe the surface of the epidermis.

The shells of such snails as *Paludina*, *Cyclostoma*, &c. &c., would be imperfectly illustrated without the opercula which close the apertures of their shells. Each one should be detached from the foot of the snail, the interior of the shell plugged with cotton wool, and the specimen gummed down in its natural position.

The preservation of slugs requires separate treatment, and I can give but little additional information to that published in my "British Land and Freshwater Molluscs," an extract from which is subjoined.

"As regards the internal shell, it may be obtained by making a conical incision in the shield, taking care not to cut down upon the calcareous plate, which can then be removed without difficulty. The animals can only be conserved by keeping them in some preservative fluid; but the great object to keep in view is to have the slug naturally extended. Most fluids contract the slugs when they are immersed in them. The slugs should be killed whilst crawling, by plunging them into a solution of corrosive sublimate, or into benzine. Models in wax or dough are sometimes substituted for the animals. A writer in the *Naturalist* gives a process for the preservation of slugs, which he states to answer admirably, and to be very superior to spirit, glycerine, creosote, and other solutions:—'Make a cold saturated solution of *corrosive sublimate;* put it into a deep wide-mouthed bottle; then take the slug you wish to preserve, and let it crawl upon a long slip of card. When the tentacles are fully extended, plunge it suddenly into the solution; in a few minutes it will die, with the tentacles fully extended in the most life-like manner; so much so, indeed, if taken out of the fluid it would be difficult to say whether it be alive or dead. The slugs thus prepared should not be mounted in spirit, as it is apt to contract and discolour them. A mixture of one and a half parts of water and one part of glycerine, I find to be the best mounting fluid. It preserves the colour beautifully, and its antiseptic qualities are unexceptionable. A good-sized test-tube answers better than a bottle for putting them up, as it admits of closer examination of the animal. The only drawback to this process is, that, unless the solution is of sufficient strength, and unless the tentacles are extruded when the animal is immersed, it generally, but not invariably, fails. Some slugs appear to be more susceptible to the action of the fluid than others; and it generally answers better with full-grown than with young specimens. But, if successful, the specimens are as satisfactory as could be desired; and, even if unsuccessful, they are a great deal better than those preserved in spirit; for, although the tentacles may not be completely extruded, they are more or less so.'"

The Testacellæ I have treated in the following manner: by partially drying them in sand, and removal of the soft parts through a cut in the length of the foot, filling up with cotton wool and a renewal of the drying.

Our land and freshwater snails have other structures besides their shells which should claim our attention. These, which include their jaws, tongues, and some other minute parts, are not so inaccessible as one is at first too apt to consider, and are deservedly in favour as microscopic objects requiring a low power. Anticipating a continuation of the present article in a second on the methods of obtaining and preparing these objects, I shall therein assume that the collector has preserved the bodies or the heads of the snails in spirit, which he has removed from their shells in the process of preparing them for his cabinet. He will take care to keep separate the animals of each species.

A last word upon the mode of displaying the shells in the cabinet. Here one has considerable choice, as they may be kept in open card trays, or in glass-topped boxes, or gummed on cards, papered boards, or glass tablets. Loose specimens admit of ready examination, whilst the method of mounting permits an arrangement of individuals according to size and locality, and is much to be preferred.

THE STONE AGE FISH AND FISHING.

By Dr. Charles C. Abbott.

On the very brow of a high commanding ridge that faces the beautiful broad Delaware, and skirts an expanse of meadow that was of yore a favourite haunt of the Red man, formerly stood an extensive Indian village, that for centuries, probably, was a scene of all that characterized the life of the aborigines; for the fertile fields that now replace the wigwams are the richer for the actual thousands of skeletons that are crumbling into dust, or have long since mingled into earth, without leaving a trace of their former presence.

On upland and lowland alike, about the gravelly hill-side and in the muddy bed of the weedy creek, are still found, in countless numbers, the "chipped flint" traces of a Stone Age people. We have gathered thousands of objects from a few scores of acres hereabouts, and they seem in no way diminished in numbers as yet. So deeply buried have many finally become, that we need other means than that friend of the archæologist as well as of the farmer—the plough,—to bring them to light.

One glorious sunny afternoon of the past month of May, we turned our back to the ploughed fields where we gathered arrow-points until tired of the sport, and lazily lingered in the dense shade of giant oaks and elms that lined the hill-tops, and listened to the erratic melody of the mocking-bird, and watched, with no less delight, the cunning of a flycatcher (*Empidonax acadica*), as it tied gossamer threads to the tenderest of twigs, and wrought an airy cradle from scarcely more stable materials. So much of life abounded that was worthy of all our time and attention, that we had not given our day's "find" of relics of the dead a thought. The leathern bag of two hundred specimens was lying on the ground while yet we tarried; and most fortunate, indeed, was our lazy fit of that May day. Just where we were we would have spent no time in searching for relics had we been "out collecting;" and just here we picked up, we know scarcely why, two thin stones, that were almost concealed beneath the leaves and moss. Judge of our surprise when they proved to be two of the handsomest jasper spears we had ever seen!

We need not have wondered why they were there, and so perfect too. Since the first occupancy of this part of the State by the white settlers, there has been no disturbance of the hill-sides that face the Delaware and its meadows. Well, at any rate, *here* they *were;* one of them, a triangular blade, three inches in length, and a trace over two in width at the base. The stem is short for the blade, so it seems to us; but being *clipped* to its end, it has never been any longer. The other consists of a blade two inches and a half in length, the sides being convex instead of straight; with a stem or tongue an inch and a quarter in length, instead of half an inch, as in the other specimen.

We know that many a museum could exhibit these spear-points to advantage, but we were not in a generous mood, and so concluded to experiment with them; and the most natural means of so doing seemed to us, to spear fish, inasmuch as we had no mammal about that would allow us to come within reach.

Such spears as we have mentioned, of course, are not the true "fish-spears," such as Mr. Evans has figured as arrow-heads in his magnificent volume.* These, too, are common in New Jersey; but we could never impale a perch or pickerel with them. Our Stone Age ancestors are so far in the past that no trace of fish-spearing capability remains, provided such slender little harpoons were used; but with these big spears we could get to work, and so, after securely fastening them to slender but strong ash shafts, we went to the creek, and started on a little hunt, being favoured by having a clear sky overhead, a light little boat to float in, and water as clear as crystal beneath us.

"What fish shall we look for?" was the first question we put to ourselves. "What fish more appropriate than the gar!" we replied. "Very appropriate, but where will we find him?" Somehow we had faith from that moment that our search would be successful; and so we sculled the little boat to that part of the creek where the current was swift, and a dense mass of vegetation covered the bed of the stream. Nothing of note was seen on our little row, or scull rather, except the lazy masses of yellow jelly that has been honoured with the high-sounding name of *Pectinatella magnifica;* the magnificence being reserved for those fortunate enough to possess a good microscope. Reaching the grassy portion of the brook, we stretched ourselves full length in the boat, and with one stone spear in hand, and another handy to grasp, should we want it, we peered over the bow, and looked for gars. It is only by the merest good luck that we ever do see them here in Crossweelssen Creek, or, indeed, in the Delaware river; but our "feelings" were true to us to-day, for very soon we did spy out the long tapering jaws of a *Lepidosteus*, and we knew that behind those jaws, well concealed in the long grass, was a very active body which would dodge us, should we be any way demonstrative. When lying thus in the grass, with his head pointed up stream, it will be noticed that he is always on the edge of a patch of river weed, on the look-out for fish, as they come leisurely down the more open water. So it proved in this case; for just as we had succeeded in getting down our anchor without any commotion, and were lying perfectly still in the middle of the stream, we saw, bobbing here and there, over pebbles, sand, and sunken twigs, nose down and tail up, a mammoth chub (*Semotilus rhotheus*, Cape), as big, lazy, and restless as any of his kind. In a few moments he had reached a point within a foot of the end of the gar's now partly-

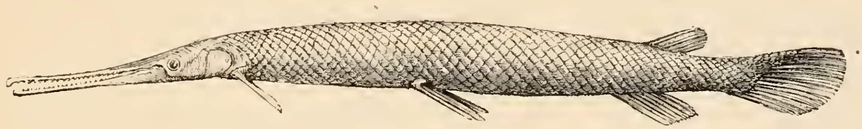


Fig. 183. The Gar-Pike (*Lepidosteus osseus*), $\frac{1}{11}$ nat. size.

* "Stone Implements of Great Britain," p. 339, fig. 302.

opened jaws. Then there was a commotion! The gar rushed, with the rapidity of lightning, upon the unsuspecting chub. He seized him midway between head and tail. The teeth of the captor had taken so firm a hold upon the chub, that he could not disengage them; and as the chub was not instantly killed, of course he squirmed terribly, to the very evident annoyance of the gar.

With the mangled chub in his jaws, the gar moved slowly out into the clear water, and we knew that our time to have a chance at the gar had come. Raising up one arm as far as we could reach, and rising up on our knees and one elbow, we measured the distance between the spear-point and the fish with a glance, and then, trusting to the little aim that we could get, thrust the spear home, with a force that would have done credit to a prehistoric hunter.

The motion of the shaft, which latter we had very wisely secured by a cord to the boat, told us we had not struck in vain,—the fish was indeed ours; and oh, but we were proud as we learned the result! Old Stone Age times came back again in very truth! The little boat was a rude "dug-out," and the great blue herons and screaming kingfishers seemed more appropriate than ever to the still, wild, unaltered, venerable Crosswcelssen Creek. But the gar did not appreciate the poetry of the time and circumstances as we did, and with the stone spear securely fastened in his side and spine, he made off as best he could; the only instance of a fish swimming with his back broken that we ever saw. Soon he came to a halt, however, and reaching the spot, we made a second thrust with greater care, and again transfixed him with the convex-sided spear. How madly he stared at us when we finally secured him! As we tried to draw him from the water to the boat, he gave one mad dash at our arms, and caught a stick that was floating by. His teeth were buried full length in the wood; and the gar died, holding on to the branch. Just as he was, except that we drew out the spears, we took his picture; and here it is.

The fish measured just five feet in length; the head being exactly one-third of the total length, exclusive of the tail. The head is the most noticeable part of the animal. The mouth is two-thirds of the whole length of the head; and its length is just eight times greater than the width. Such jaws remind one of an alligator's; but really, those of the gar are even more terrible. On either side of the upper and lower jaws we find, by actual count, one hundred and fifty very sharp, slender teeth, with their points slightly inclined toward the throat; or, in all, six hundred needle-like teeth, and every one equally sharp as the best needle ever made. Nor are these all the teeth that the gar has; for on looking a little more closely, we find on either side of the lower jaw two parallel rows of very minute teeth, which are nearly uniform in size, and very sharp. It is impossible to count them, but we judged of their numbers thus:—the rows are each nineteen inches long, and there are four of them, or seventy-six inches in all. The number on one inch, as near as we could tell, was sixty-five; or four thousand nine hundred and forty teeth. In the upper jaw are two rows of similar teeth, each sixteen inches in length, giving two thousand and eighty more; or in all, seven thousand six hundred and twenty teeth in both jaws. It is not to be wondered at that the chub did not escape when once fairly caught in such jaws as we have described.

The gar (*Lepidosteus osseus*) is, with the sturgeon, the only ganoid fish to be found in the waters of this State; and as he comes into shallow waters and quiet streams that attract the zoological fisherman more than does the deep river, where the sturgeon alone is met with now; so he seems the *only* link between an earlier geological period and our own times. He seems to have escaped the innumerable influences of natural selection, and is now just as he was before the first Red Indian wandered along the shores of our river, or floated on its bosom in a rude canoe; and how many centuries since then, who can say? It seemed the proper thing to do—to use, if we could, these handsome jasper spears to capture this "remnant of archaic times;" and we believe our *modus operandi* varied little from the method of the prehistoric fishermen, who, centuries ago, hunted them as eagerly as did we a few days ago,—when Crosswcelssen Creek was innocent of bridges, and bore upon its bosom only the rude canoes of a mysterious Stone Age people.

MONSTROUS PLANTS IN 1872.

I HAVE always supposed that a very wet season such as the memorable one we have just experienced, must have a great influence in causing abnormal growth in plants; but I have certainly seen fewer monstrosities during this year than usual. Even the White and the Alsike Clovers, which are always more or less given to eccentricities, have been, if anything, less subject to prolification than they often are.

Scarlet Geraniums, however, have been very proliferous. The wet weather has had a decided influence upon them, causing them to produce a great quantity of leaves and very few flowers; so that the geranium beds have not been by any means as brilliant as usual; and I think this has been remarked everywhere. But when the flowers did put in an appearance with the moderately fine weather in August, a great proportion of them were proliferous, producing a leaf or two below the flowers, and very often a second umbel growing from the side or the middle of the earlier one. I have noticed that (in my own garden) the variety called "Stella" has exhibited this peculiarity to the greatest extent: I wonder whether it has done so elsewhere?

In the garden, several very proliferous cowslips have been gathered, due probably to the richness of the soil rather than to the wet weather; for they, of course, flowered before the great bulk of the rain had fallen; and I notice that manure causes a very luxuriant growth in all species of Primula. I have found several in which a second scape of flowers grew from the middle of the umbel; an approach to the tiers of flowers seen in the new *Primula Japonica*. I found a similar monstrosity in a flower of the Bardfield Oxlip (*P. elatior*, Jacq.), and in this specimen the scales below the umbel had become partially leafy as well. It *is* probably due to the wet weather that my plants of *P. elatior* have never quite ceased flowering during the whole of the summer. A great many of the scapes have furnished examples of "recrudescence," a few flowers having been produced amongst the ripening capsules; but fresh flower-stalks have also continued to shoot up from the root, and at the time I write (Oct. 4) I see there is one very pretty bunch of flowers upon a last year's seedling plant.* The Rev. H. Bramley-Moore sent me a plant which had been brought from the Pyrenees; the flowers upon it were very nearly over; but in my garden it soon put up new and much larger leaves, and came into flower a second time.

A flower scape of the common Cowslip was very curiously developed. The whole scape was about twenty inches long. At the height of ten inches there grew a bunch of leaves, one being the ordinary size of a cowslip leaf, the others much smaller. From the axils of these leaves were produced a second lateral scape and a single flower upon a long pedicel, after the way of a primrose. The lateral compound scape was at least eight inches in length, and supported an umbel of nine flowers. The principal umbel was in two tiers, the upper tier being raised on a stalk a couple of inches long. The whole of this exuberant flower bore no less than thirty-eight pips. I have very little doubt that if I had pegged down the flower-stalk, it would have thrown out roots from the base of the leaves, and become a separate plant, like a strawberry runner. I hesitated whether to do so, or to cut it off for preservation; but I cut it off at last, and dried it.

A couple of dried flowers of common primrose reached me in a roundabout way, without any particulars, so I do not know whether they were gathered this year or not; but I suppose them to be products of 1872, as they were still of a pretty good colour. In these flowers complete dialysis had taken place in the calyx, which consisted of five distinct *linear* sepals. In a garden polyanthus which I gathered in the public park at Oldham, dialysis of the corolla had taken place, and all the flowers were formed of separate petals. A common out-of-door Scarlet *Azalea* has had all its flowers split up into their component petals. The flowers themselves were not more than half their usual size, and not very numerous, the plant having run to leaf instead of flower.

As a probable result of wet weather, I have noticed that trifoliar branches have been very frequent; I mean the production of three leaves in a whorl, instead of two opposite leaves, and it has even occurred in plants which usually have alternate leaves. The malformation has been very common in the Fuchsia, and the flowers have also hung in threes instead of in pairs. It is a decided improvement in the fuchsia, and I should not wonder if a strain of triple-flowered fuchsias could be produced by growing the plants from these trifoliar branches. It is worth trying. The *Weigelias* also and the Scarlet Geraniums have been very liable to produce three leaves in a whorl.

I have gathered two bi-pinnate leaves of "Jacob's Ladder" (*Polemonium cæruleum*) from two separate plants.

One of the most interesting examples I have seen this year is that of *Ranunculus acris*, where chorisis had taken place in most of the leaves, each leaf being divided into three distinct leaflets upon long petioles, but all proceeding from one sheath at the base; and this abnormal form was found in almost every plant for fifty or sixty yards along the shady side of a hedge.

One more example is worth recording, not as being exactly abnormal, but as a curious result, probably, of hybridization. In the very middle of the heart of a cabbage that was brought in to be cooked, there was a single streak of red cabbage upon one of the leaves, looking like a splash of purple paint. If the plant had been left to run to seed, and its inner leeves had resumed their green colour, it would, perhaps, hardly have been noticed; but the contrast between the purple streak and the delicately white leaf was very remarkable. The plant showed no other stain in its pedigree, and one could not help wondering why a cross between two such different varieties should only have become apparent in such a small degree, and in this particular way.

Robert Holland.

* Whilst I am correcting this on Nov. 15, the scape is still in bloom, and two other old plants are flowering again, and put ing up single flowers like primroses, as well as the ordinary umbels.

THE THYSANURADÆ.

THE inquiries which one often has to answer lead me to think that a few remarks upon the Thysanuradæ will be acceptable to the readers of SCIENCE-GOSSIP, particularly to those who, like myself, have had much difficulty in getting information about these interesting creatures. For a long time I was in this position; but the recent papers of Sir John Lubbock, published in the Linnean Society's Transactions, and Dr. Packard's article on Bristletails and Springtails in the *American Naturalist*, have greatly facilitated my studies, and I have much pleasure in acknowledging my obligations. Shortly, it is to be hoped, Sir J. Lubbock's monograph will be published, and then students will be able to enter upon the study of the Thysanuradæ under greater advantages.

The Thysanuradæ are divided as follows:—

THYSANURADÆ.

Lepismadæ.	*Poduradæ.*
Japyx.	Smynthurus.
Campodea.	Podura.
Lepisma.	Lipura.
Petrobius.	

The imperfect remarks which I beg to offer in the present article will be restricted to the Lepismadæ, space being limited; but I hope in a second paper to offer a few notes on the Poduradæ, and I trust that what may be said may be of advantage to some who are working upon the subject, and stimulate one or two new adherents.

By the formation of their mouths, which are designed for nibbling their food, the Lepismadæ seem to have affinities with some of the Neuroptera among the insects. But the question as to their proper classification has been a disputed point with several great naturalists. I need only briefly allude to a few of the difficulties that systematic classifiers have met with. Some, bearing in mind their respiratory system, which in most of the Thysanura is tracheal, and the resemblance which certain species have to the larval condition of some of the Neuroptera, have not hesitated to class them among the insects; but here they have paused, and between the consideration whether the Thysanura should come among the Neuroptera or among the lice and other apterous insects, they seem to have had a severe struggle, which ended in this group being shelved altogether, or dismissed with a few superficial remarks. Others, again, have drawn very different conclusions, based on the comparison of certain points in their anatomy, or at least the anatomy of several members of the group, with similar anatomy in the Myriapoda. These authorities incline to place them at the very bottom of the insects, or at the top of the Myriapoda. Among these points may be mentioned that there is (1) no metamorphosis; (2) the eyes are mostly groups of ocelli; (3) there are extra-abdominal appendages in some, which answer the purpose of feet; (4) and a few species among the Poduradæ are believed to breathe through the skin, without the assistance of tracheæ at all.

But I must pass away from generalities, and attend to my primary object,—viz., to enable readers to identify their captures, and to guess if any thysanurous insect they may find is to be suspected of being unknown to Science or to the British fauna.

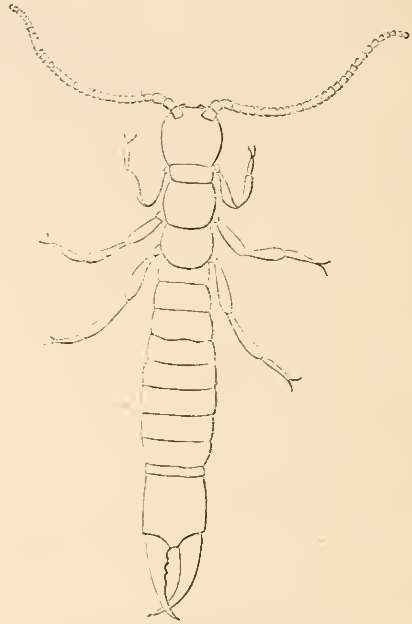


Fig. 184. Japyx, from the *American Naturalist*, April, 1871.

For the figures of Japyx and Campodea, I have borrowed two of Dr. Packard's illustrations to the article in the *American Naturalist* I have above alluded to. Recently, I had a few specimens of the latter, and I am under the impression that I have, at a period when I could hardly distinguish a beetle from an earwig, seen Japyx frequently.

If my memory serves me right, I used to see it in damp mould suddenly turned up with a spade or a trowel, and I used to think then that the colonies I disturbed were larval earwigs, a mistake which a glance at the illustration will show is easily made. The specimens of Campodea, four in number, which I had given me lately, were of creamy-white colour, apparently eyeless, and extremely fragile; nevertheless they were amazingly active, and sensitive to the influence of light. They would dash about the cell containing them whenever I brought it out for observation, and at last three of them met a sad end. One day I wished to shift and clean the cover, and they quickly seized the opportunity to escape. If they had all run in one direction, I might have secured them again; but they ran four ways, and in my nervousness I only got one back into the cell, minus a few joints of the antennæ and caudal filaments. The rest got miserably crushed,

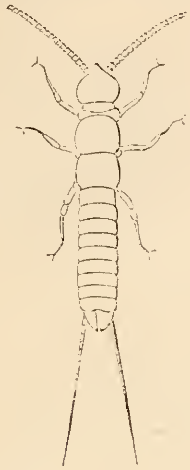


Fig. 185. Campodea, from the *American Naturalist*, April, 1871.

and were only fit to use as food for the one I retained. Shortly after this little escapade, my captive changed its skin, a process similar to what takes place with many other creatures: the skin burst down the middle of the thorax, on the dorsal surface, and the insect wriggled itself out. The specimens I am alluding to were found in a cellar in London, and were just a sample of myriads that the removal of an old boiler forced to seek fresh quarters.

Lepisma saccharina is the little creature known to the vulgar as the "Fish-moth." It lives in old houses, and is very destructive to paper and books in damp libraries. I have seen documents nibbled in places to the thinness of tissue-paper, and with numerous holes, produced from drawers where their owner had placed them in a perfect state a year or so before, the destruction being entirely the work of the *L. saccharina*. I once found a very large colony in the interior of a small loaf of bread which had lain unobserved in a cupboard for some weeks. And I have watched them with much interest (as a youngster) cunningly at dusk come forth from the hearthstone, to seek the crumbs under the kitchen table, and as knowingly retire in the morning to the shelter of the hearthstone.

I have kept *L. saccharina* for prolonged periods in my cork cells, and have strong suspicions that it brings forth its young alive in couples, for on more than one occasion two small young ones, perfectly destitute of scales, and of creamy whiteness, have suddenly appeared, when, a few hours previously, I had no reason to suppose the cell had other occupants than a couple of adults. Sir J. Lubbock, however, has suggested to me as a caution, that possibly the female is able to carry her eggs about with her for some time previous to their hatching.

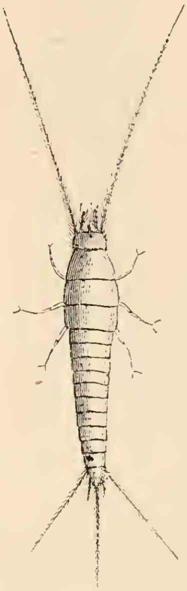


Fig. 186. *Lepisma saccharina*, × 8.

The colour of the *Lepisma saccharina* is of a silver-grey, and it is about one-third of an inch in length. The eyes are in two groups, of twelve ocelli in each, situated at the sides of the head, near its junction with the thorax.

I have never seen but one British species. Two others — importations from West Africa and Bombay respectively—have been given me by W. T. Loy, Esq., in a living state. The former was much whiter than our English species, though its scales were very similar; and the latter was a speckled insect, its colours being black, brown, and drab, without any iridescence. The scales are very beautiful objects under high power, and different from *L. saccharina*. It may be in the recollection of some, that the scale of *Lepisma saccharina* has, with other thysanurous scales, been a bone of contention of late, Dr. Pigott having attacked Mr. R. Beck's interpretation of its structure. We have had corrugations, beads, and barley-sugar markings almost *ad nauseam*.

Petrobius is, so far as I am aware, represented in Britain by only two species; one frequenting our coasts, and the other damp, stony inland places. The eyes in both occupy the whole front of the head, and are more insect-like than in the rest of the Thysanuradæ. The females in both species are furnished with ovipositors; that of the marine species is of extreme length, but the few specimens I have seen of the inland one have had much smaller developments of this, and indeed of all the filamentous limbs.

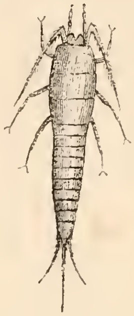


Fig. 187. Inland Petrobius, × 8, from North Wales and Devonshire.

The marine species carries its antennæ out straight before it, while the inland species doubles them over its shoulders, so to speak.

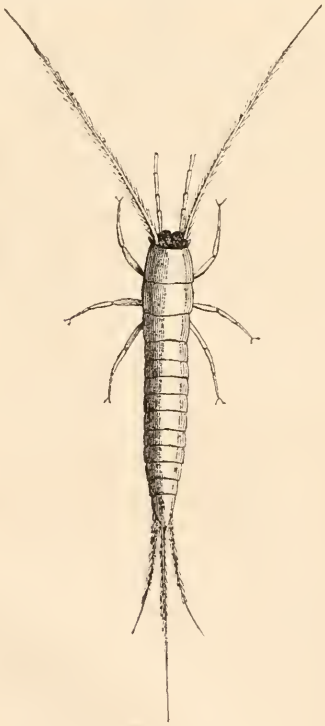


Fig. 188. *Petrobius maritimus*, × 8.

When turning over the stones at the foot of the cliffs of the Dorset coast, one often comes across the homes of *P. maritimus*. Under these circumstances, they are found in dozens, to say the least of it. Attached to the stones one turns up, too, are found the exuviæ in abundance, looking almost lifelike; and these, while the frightened creatures are jumping frantically in various directions, mystify the eye of the inexperienced, and make him fancy the Petrobius is there in hundreds.

To catch the living insects, then, needs no little dexterity, as they are wary and active to a surprising degree.

Petrobius is, however, fond of wandering over the rocks in the sunshine, and when thus met singly, he may be coaxed into a test-tube by means of a camel-hair brush, without much trouble. You must be cautious in your approach, however, for if alarmed, he will jump and run from rock to rock so nimbly, that your shins and ankles will probably suffer if you follow him up.

I suppose the Petrobius feeds chiefly at night upon the decaying seaweeds, and other rejectamenta of the deep, which are within easy walking distance of his dwelling. I guess this because I have never seen them feeding, and have been always unable to keep them alive long in confinement—not more than a day or two. A fine large specimen will die in a few hours if shut up in a bottle or a large cell. In colour, the *P. maritimus* is of a warm brown, with dark patches and olive-green reflections.

The scales are very various in their appearance, and very beautiful. So also are those of the inland Petrobius; indeed I think they are the best, though they are very similar to those of *P. maritimus*. The colour of the inland species is very similar to the marine one: my specimens, from North Wales and Devonshire respectively, were, if anything, rather the darkest.

The specimens sent me from North Wales were found under stones, and my Devonshire specimen was caught after harvesting, at the bottom of a van which had been emptied of its load of corn, amid beetles and other creeping things galore.

I hope shortly to renew the subject, and submit some notes respecting the remainder of the Thysanuradæ. S. J. McIntire.

SNAKE-STONES.

By this term, gentle reader, we do not mean the porous bodies, commonly so called, which Sir Emerson Tennent and others have shown to be used by the natives of Ceylon and elsewhere for the purpose of absorbing the poison from snake-wounds. In Scott's "Marmion" may be found a traditional reference to quite another kind of "Snake-Stones":

"And how the nuns of Whitby told
How of the countless snakes, each one
Was turned into a coil of stone,
When holy Hilda prayed.
Themselves, within their sacred bounds,
Their stony coils had often found."

To this day, in the neighbourhood of Scarborough and Whitby, the fossil Ammonites which are so abundant and characteristic in the Lias and lower Oolitic formations, go by the name of "Snake-stones," or "Petrified Snakes." You may see them in the lapidaries' shops named as such, and not unfrequently having casts of snakes' heads attached to them—the latter being a "restoration," perhaps,

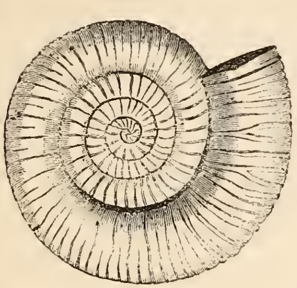


Fig. 189. *Ammonites communis.*

Fig. 190. Side view.

on a par with "restorations" generally! The commonest species selected for this purpose are *Ammonites annulatus* or *A. communis*, whose closely ringed whorls strongly resemble coiled-up snakes—hence the legend.

What are these common and beautiful fossils? There are no fewer than five hundred species known to geologists, ranging, in geological time, from the Lias to the Chalk formations inclusive. Few fossils are more beautiful, each species having a distinct ornamentation, and, perhaps, even each stage of

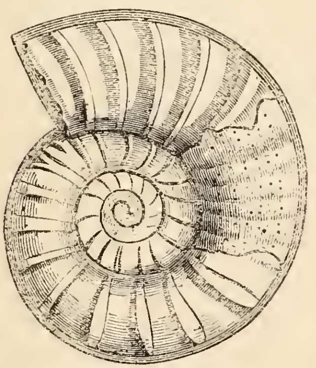


Fig. 191. *Ammonites obtusus.*

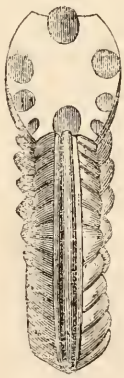


Fig. 192. Side view.

individual growth. Their name of Ammonite is derived from the *Cornu Ammonis*, or "Jupiter-Ammon's" horn, by which they were known among the *virtuosi* of a century ago. Their natural history relations, however, are with the Nautilus, which beautiful family is now approaching extinction, having been in existence since Silurian times. The chambers of the common Nautilus, as our readers will have seen, are straight and simple along their edges, and the siphuncle, or air-tube, runs down the centre of each chamber, and connects them all together.

The Ammonites were first cousins to the Nautilus. Before their appearance in the seas of the Liassic epoch, their place had been occupied by a kindred group, called Ceratites. Instead of having the chambers straight, however, the Ammonites had theirs foliated or serrated very ornately and complexly along their edges. In the Goniatites, which abound in the carboniferous limestone, these chambers are angled—hence the name of the genus. In the Ceratites, which are characteristic of the Trias formation, the edges of the chambers are foliated, but not so intricately as in the Ammonites, whilst that part which projected towards the mouth of the shell was tolerably simple. It is a significant fact that the young Ammonites greatly resemble the Ceratites, losing this resemblance as they got older. The geographical distribution of the Ammonites is very great. They are found in the secondary rocks of Europe, South Africa, America, India, and the West Indies.

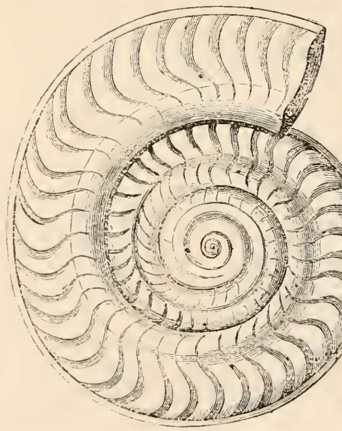


Fig. 193. *Ammonites bifrons.*

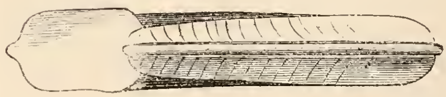


Fig. 194. Side view of ditto.

At present a good deal of artificial arrangement exists among these interesting fossils, and it is known that different species have been so classed which are really nothing but the distinct and various stages of marked individual growth. They are roughly divided into six groups, as follows:—1. The back marked by an entire keel; 2. Back crenated; 3. Back sharp; 4. Back channelled; 5. Back squared; and 6. the back round or convex.

The largest of these "Snake-stones" occur in the

Portland beds, where they are often four feet in diameter. Their size thus unfitted them for rapid locomotion, and it is known that they were provided with a means of closing the mouth of the "body-chamber" by opercula. The latter are occasionally met with separately, and have had the distinct name of *Aptychus*, or Trigonellites, given to them. The seas of the Lias and Oolite must have literally swarmed with these beautiful objects, for the Lias limestone is often made up of their shells alone, and the black colour is probably due to the decomposition of the animal matter of the soft-bodied parts. The moment you strike these rich fossiliferous limestones with your hammer, the blow volatilizes a portion of this oil, and its sulphuretted odour greets your nostrils, and tells you plainly that these solid rocks are nothing but sepulchres of forgotten dead! The Lias and lower Oolite beds in England are often marked by the prevalence of distinct species of Ammonites, so that they serve as good indices to the geological position of a stratum. When cut open, the chambers of these fossils are seen partly hollow, and partly filled with crystals of carbonate of lime, darkly coloured, perhaps, with organic matter. When the shells are more solid, they are manufactured into brooches, &c., and go by the name of "Shell Opal."

J. E. Taylor.

MICROSCOPY.

Micrographical Dictionary.—A correspondent asks—"Might not a word from you in Science-Gossip bring the editors or publishers of the edition of 'The Micrographical Dictionary,' now in course of publication, to a sense of their negligence in bringing out that publication so slowly and irregularly? No part has appeared since May last! Can it be that it is not intended to complete it?"—*W. L. N.*

Bunt of Wheat as a Lens (Translation).—In looking over your interesting journal, Science-Gossip, which I have taken for some time through my bookseller, I find, on page 92, in the volume for 1871, a very curious note from your correspondent "F. W. M.," under the title of "Bunt of Wheat as a Lens." It relates to an arrangement by means of which the eye of a beetle, mounted in balsam, and placed under the microscope, shows in each facet the image of a small object. Without stopping to consider the principal object of the above note—whether the fungus *Tilletia caries* possesses the same optical property,—I should like to ask your correspondent if he would direct me how to operate with the reticulated eye of an insect, so as to obtain, under the microscope, multiplied views. I do not think that an ordinary preparation would be sufficient. What means should I take to obtain my desired object? I venture to count on the courtesy of the author of the note referred to to help me, and I address myself also to any other microscopist who would kindly give me any assistance.—*A. M., Paris.*

Mounting in Balsam or Dammar.—It is much to be regretted that directions for mountnig in soft balsam or dammar should still require to be given. Cuticles, insects, sections of wood, horn, transparent injections, &c., can all be mounted in hard balsam without the slightest difficulty. The most important condition is that the balsam should be new, or, at least, uncontaminated with turpentine, benzole, or chloroform. The plan I adopt is as follows:—Place a drop (or as much balsam as is necessary) on the centre of a glass slide; heat it (taking care to avoid boiling the balsam) until the balsam, when cold, can be scarcely indented with the nail; take the preparation out of the turpentine (draining off the superfluous turpentine); place it on the centre of the hardened balsam; allow it to remain a few seconds, or until it sinks a little into the balsam: now drop a minute quantity of soft balsam on it and place the covering glass, slightly warmed, on the soft balsam—this, if properly managed, will cause it to spread over the preparation, and generally over the surface of the hardened balsam: now place the cover and slide between a wire clip; gently warm the whole over a spirit-lamp: the heat and pressure will drive out the superfluous soft and hard balsam. When cool, the waste balsam may be scraped off, and the slide cleaned with a little spirit of wine and ammonia. There may be some very exceptional specimens where the slightest amount of heat would be injurious, and then, if balsam or dammar is used in the soft state, the cover (a square one is best) should be protected by a piece of gummed black paper the width of the cover, and about half an inch larger, with a hole punched in the centre. This will prevent the cover slipping, a disaster usually befalling soft balsam slides. Balsam or dammar *never hardens* under the cover, and if the cover is rubbed or pressed it invariably shifts, or the medium exudes, and the slide becomes a sticky abomination. My own slides may be rubbed with a piece of chamois leather between the finger and thumb, without receiving the slightest injury. —*F. Kitton.*

An Eightieth Objective.—At a recent meeting of the Quekett Microscopical Club, held at University College, Mr. Thomas Powell attracted considerable attention by the exhibition of an eightieth of an inch object-glass made by himself. Of course, under the circumstances of its being exhibited in a public room, it was not possible to test this glass very severely, but it appeared to perform well, defining the podura test sharply and without colour, and having plenty of light. Its magnifying power is 4,000 diameters with the A eye-piece, with an angular aperture of 160°; it bears the B and C eye-pieces, with no other detriment than some loss of light, and works well through covering glass ·003 thick. Should Mr. Powell be able to produce these glasses, they promise to be an important addition to our microscopic powers.—*H. H.*

Coal Section.—Can any contributor kindly say if there is any way of judging what piece of coal is likely to form a good section; as you may try a good many without getting a decided vegetable structure?—*E. T. Scott.*

A Singular Rotifer.—We should have stated, in our notice of *Pedalion mira* of last month, that this object was first figured and described in the *Monthly Microscopical Journal* of September, 1871, where the reader will find a detailed account of it.

ZOOLOGY.

The Exploring Expedition, under the charge of Professor Wyville Thomson, was to sail in the middle of November. The vessel fitted out for this purpose is the *Challenger*, of 2,306 tons burden, commanded by Captain Nares. The scientific staff of the expedition includes: Professor Wyville Thomson, F.R.S., Director; Mr. J. J. Wild, of Zurich; Mr. J. Y. Buchanan, Chemist to the Expedition; Mr. H. N. Moseley, M.A., Naturalist; Dr. Von Willemoes Suhm, of Munich, Naturalist; and Mr. John Murray, Taxidermist. Dr. Willemoes Suhm and Mr. Moseley undertake the Invertebrata, and Mr. Murray the Vertebrata; Mr. Moseley also undertakes the duties of botanical collecting, &c. An experienced photographer also accompanies the party. The *Challenger* has been specially fitted for the work, with two engines of 400 horse-power each; and stages amidship from which the dredges will be worked. Several hundred miles of the best whaling line have been prepared for dredging, and the vessel carries out with her no fewer than forty dredges. The route, which is not yet definitely fixed, is supposed to be as follows:—The *Challenger* will probably go round to Portsmouth, and sail from thence in the beginning of December for Gibraltar, the first haul of the dredge being made in the Bay of Biscay, if the weather should chance to be favourable. From Gibraltar she will proceed to Madeira, thence to St. Thomas, the Bahamas, Bermuda, the Azores; from thence to Bahia, touching at Fernando Norohna; then across to the Cape of Good Hope, and, after a stay in that neighborhood, southwards to the Crozetts and Marion Islands and Kerguelen's Land. A run southwards will then be made as far as possible to the ice, and the course thence be made to Sydney, New Zealand. The Campbell and Auckland groups, Torres Straits. New Guinea, and New Ireland will then be visited, A long cruise of perhaps a year will then be made amongst the Pacific Islands; thence the expedition, passing betwen Borneo and Celebes, and visiting Luzon and its neighbourhood, will proceed to Japan, where a stay of two or three months is expected. Thence northward to Kamtschatka, whence a run will be made northwards through Behring's Straits, and then through the Aleutian Islands, southward to Vancouver's Island, and so through the deep eastern region of the Pacific by Easter Island, and possibly by the Galapagos Archipelago to the Horn, and thence home. The voyage is expected to take about three and a half years.

Red Viper (*Pelias berus*).—Allow me to record in your pages the capture of a specimen of this viper at Checton, a few miles from hence, last month. It measures about eleven inches in length, being about the size of that mentioned in Bell's "British Reptiles," p. 67, and the colouring very bright. I shall be obliged if any of your correspondents can inform me whether or not this variety is generally distributed throughout the British isles.—*E. B. Kemp-Welch, Bournemouth.*

Popular Natural History.—An interesting and well got-up *brochure* has been issued by Messrs. Millikin and Lawley, giving a series of Popular Lectures for the Magic Lantern. In addition to the general historical and other subjects, a large portion is devoted to astronomical, geographical, and natural history questions. The illustrations for the latter have been selected from typical and well-known forms, so that the teaching of the leading principles of zoology has been reduced to its simplest elements. The descriptions of "Underground Life," as shown in coal and metal mines, are particularly good, and these include a good deal of geological phenomena.

A Fly mistaken for an Annelid.—The flies in the bottle sent were bred, the one from a larva which is the supposed Annelid, *Diplotis hyalina* of Montague, the other from a pupa found at the same time and place. Montague mistook the head of the grub for its tail, the two ear-like appendages being at the anal extremity. I found it pretty abundant among drifts, sea-weed, &c., at high-water mark, in company with *Orchestia littoralis*, at Colwyn Bay, in October. It struck me at once that it was probably the larva of one of the numerous flies on the sea-weed. One lived some hours in salt water, but seemed very helpless, and out of its element. The anal appendages might perhaps be suckers, by which the grub attaches itself to sea-weed at high tides, to avoid being washed away, but I must say that it did not use them in a glass bottle, full of sea water. I regret that I did not examine the larva under the microscope but have no doubt I can get more next summer if not now. Anyhow the genus *Diplotis* is disposed of! Montague describes and figures Diplotis in, I think, vol. xi. of the "Journal of the Proceedings of the Linnean Society." He remarks on its resemblance to the larva of an insect. Gosse includes it among his doubtful genera of arenicolous Annelids.—*Alfred O. Walker.*

Provincial Societies.—We have received several numbers of "The Yorkshire Naturalists' Recorder," which is devoted to reporting the meetings of natural history societies in Yorkshire and the neighbourhood, and to such notes and queries and general observations as come under the notice of or interest local naturalists. It is well conducted, and cannot fail to stir up an enthusiasm in the study of nature. We want more attention to be given to the fauna and flora of each neighbourhood. The "Proceedings of the Bristol Naturalists' Society," from January to May, 1872, contains some good papers, but few devoted to the natural history of the neighbourhood. It seems strange to find a paper on "Australian Fossils" in such a publication as this. The "Anthropology of the Danubian Region," although by such a good ethnologist as Dr. Beddoe, would, we think, have been better in a journal devoted to such subjects. One naturally associates the botany and zoology of a district with the "Proceedings" of a local society devoted to such studies, and is apt to be disappointed when we find every other subject treated but those we wished to see. The ninth annual Report of the Belfast Naturalist Field Club is much better in this respect, although it is not free from the same temptation. The strength and enthusiasm of the society is well indicated by the number of its excursions during the last summer, all of which are very well described. Among the most important papers are "An Inquiry into the Possibility and Probability of the Occurrence of Coal in the Neighbourhood of Belfast," by Mr. William Gray; "The Geology of Cultra, co. Down," by Mr. Joseph Wright; "A Day with the Oyster-dredgers," by Mr. S. A. Stewart; "Giants' Graves," by Dr. Holden.

BOTANY.

Insect Agency on Plants.—A very suggestive article appears in the *Journal of Botany* for November, by Mr. A. W. Bennett, on the Influence of Insect Agency on the Distribution of Plants. Mr. Leo. Grindon had shown that there is a general absence from the neighbourhood of Manchester of fragrant labiates—in fact, of every labiate that yields a powerful odour, except *Stachys sylvatica*, and this is regarded as suggestive of the absence of fertilizing agencies, in the shape of insects, that are attracted by these flowers. There are no known climatic reasons for the absence of these common plants, and Mr. Bennett recommends that particular notice be taken by local botanists and entomologists of the part played by insects in the fertilization of our common plants. He shows that a list of the insects that have been observed to be active in the fertilization of our common wild flowers would be of the utmost value.

Epipactis palustris and E. latifolia.—In a recent number these two plants are considered of sufficient rarity (particularly the first) to be worthy a special notice. In the romantic Castle Eden Dene, Durham, both these plants are to be found in abundance, particularly *E. latifolia*, which may be gathered by the wayside; the *palustris* is to be searched for in damp and boggy spots: but what I have always considered a much rarer plant is the *E. ensifolia*, which is to be found there flowering in the end of May or beginning of June and its white flowers are most conspicuous in the spots where it grows. Perhaps there are few spots in England so rich in botanical treasures as Castle Eden Dene. I have seen in this favoured spot not only the plants I have named, but also the Fly Orchis (*O. muscifera*), the Butterfly Orchis (*O. bifolia*), *O. pyramidalis*, the Bird's-nest Orchis (*L. nidus-avis*), and the still rarer and curious Lady's Slipper (*C. calceolus*). If any south-country botanist were to devote a day to ramble in Castle Eden Dene, he would find a great treat in store for him. The graceful Lily of the Valley there grows in wild luxuriance, clothing in many places considerable spaces with its elegant leaves, and when they are in flower, perfuming the air with their fragrance. As the summer advances, the elegant and sweet-smelling *Pyrola rotundifolia* is to be found in several places; but it would take a larger space than I can ask for in this instance to enumerate all the botanical and entomological varieties to be found in Castle Eden Dene.—*T. I. B., Ferryhill, Durham.*

Potentilla fruticosa.—Has a stray individual plant of this rare species ever been seeen on the Durham or northern bank of the Tees? I have looked all along this side where the river brink was accessible, and did not meet with so much as an accidental waif (stray plant). "Ad ripam meridionalem Tesæ fluvii infra vicum Thorp dictum variis in locis necnon infra cœnobium Athelstani vulgo Eggleston Abbey in agro Eboracensi."—Dillenius, in *Raji Synopsin*, 256. Where are Thorp hamlet and Eggleston Abbey? Compare Dillenius' edition of Ray's Synopsis; also Jenkinson's and Robson's Floras. This rare British species is found, I believe as low as Winch Bridge, halfway from Middleton to

Mickle Force. At the latter station it is plentiful, and there are a few good colonies opposite Weddybank, only on the Yorkshire or south bank of the Tees.—*A. I.*, 28, *Upper Manor Street, Chelsea.*

London Orchids.—Certain species of the Orchid family have recently been detected in places where they hitherto have been neither seen nor reported; viz.: 1. *Epipactis palustris* in Surrey, not more than four or five miles from the metropolis. *E. purpurata* (? a provisional name), still grows in the flower-beds and lawn of Chace Cottage, near Enfield. This fact has been already reported. Recently it has got two other fair companions, viz., *E. latifolia* and *Listera ovata* (Tway blade). These are the remains of the ancient Chace flora.—*A. I., Chelsea.*

Metamorphosis of Organs in Lophospermum.—I beg to subjoin particulars of a *Lophospermum*, in which every part of the flower has in turn been converted into a leaf: calyx, corolla, stamens, pistils, seeds. All the annexed modifications occurred in one plant, except the extra petal. *Lophospermum:* Nat. order *Scrophulariaceæ*. Characteristics of normal flower—Calyx: sepals 5, edges entire, convex towards corolla. Corolla: tubular, 5-cleft, red-purple. Stamens: 4, and 1 minute anther, 2 discs. As modified by metamorphosis—Calyx: (*a*) sepals 4; (*b*) unsymmetrical; (*c*) with central streak of red; (*d*) flat; (*e*) like stem-leaves, with serrated edges, and on leaf-stalks. Corolla: (*a*) absent, or rudimentary; (*b*) green; (*c*) an extra strap-shaped petal ($\frac{3}{4}$ in. by $\frac{1}{10}$ in.), red, springing from outer upper edge of ovary, by side of upper sepal; (*d*) 5 separate leaves on leaf-stalks; (*e*) split along top. Stamens: (*a*) when corolla split, anthers enlarged, consisting of ovals forming an arrow-head; (*b*) minute; (*c*) filament short, anthers dark; (*d*) anthers, leaves with serrated edges; (*e*) anthers streaked with red. Pistil: (*a*) long, bearing leaves at extremity; (*b*) bearing leaves and abortive flowers. Ovary: (*a*) bunches of small leaves, with serrated edges, on footstalks. Stem-leaves: (*a*) tinged with red. Proliferous varieties—sepals on footstalks, flowers springing from axils: (*a*) central axis bearing alternate leaves like the stem, with terminal flowers; (*b*) central axis bearing at the end seven calyces fitting closely into each other: within the central one a modified dwarfed corolla with an augmented number of stamens; small corollas on stems growing from between these calyces. In the most modified form, where calyx, corolla, stamens, pistil, and seeds, were all leaves on footstalks, serrated and shaped like the cauline leaves; the fact of their representing these parts was only evident from the leaves all springing from the same plane, instead of being placed at intervals along the stem. It was, in fact, the condensed, bushy head, terminating some of the stems, that first drew attention to the plant.—*T. D. Smeaton, Adelaide, South Australia.*

Singular Scabious (p. 258).—I find two specimens in my herbarium somewhat similar to that described by "T. B. W." One, gathered near Cheltenham about twenty years ago, has the umbel composed of eleven small heads, on very long stalks, in addition to the central and principal head. In the other case (from Esher, Surrey, 1846), there is a single head only, on a short stalk, issuing from the base of the true head of flowers. These are the only instances I have met with in this plant of the proliferous or "Hen-and-Chickens" form of growth.—*W. W. Spicer, Itchen Abbas.*

Kew Herbarium.—It is stated that upwards of one hundred and ten thousand species of flowering plants alone are preserved in the Herbarium at Kew.

GEOLOGY.

An American Fossil Lion.—Prof. Leidy has described a new species of lion under the name of *Felis augustus*, from teeth and fragments of jaws discovered in Nebraska. The most characteristic specimen is an upper sectional molar as large as that of the Bengal tiger.

A Modern Trilobite.—It is stated by the *American Journal of Science* that Professor Agassiz discovered, on the 12th of February last, about forty leagues to the east of Cape Frio, whilst dredging at a considerable depth, a crustacean, with a great number of rings, and which was three-lobed; thus possessing some of the chief distinctive marks of the ancient trilobites. The name of *Tomocaris Peircei* has been given to the animal.

Porosity of Soils.—The porosity of soils could not long be preserved if the mineral dust were not agglutinated into granules by some substance acting as a cement, such as vegetable mould, or clay coagulated by lime salts. The required proportion of the latter is ascertained by mixing known weights of levigated clay with sand or chalk, drying till the still moist mass crumbles in the fingers, and besprinkling it very gently for three or four days with water containing traces of lime salts. With proper quantities of clay the soil preserves its character; in other cases it is softened, and becomes impermeable. For one hundred parts of sand, about eleven of clay are required; for chalk, a slightly larger amount. If, instead of clay, soluble or insoluble humates be used, it will be found that one per cent. of humic acid with lime or clay (or two per cent. if strongly dried and pounded) will enable the earth to resist a long washing. In light soils vegetable mould, by means of its humates, consolidates their particles; whilst in heavy ones, by its organic *débris*, it destroys their solidity and impenetrable character, in both cases maintaining for some time the porosity of the soil.

The Divining-Rod.—Mr. H. B. Woodward mentions, in the last number of the *Geological Magazine*, that on the Mendip Hills the divining-rod is still used. He went a short time ago to the little hamlet of Gurney Slade, near Oakhill, to look at a shaft that had been sunk for iron-ore. Several trial holes had been sunk, and some of these had been made at the instigation of the divining-rod—we need hardly say without success.

New Species of Graptolites.—In the Nov. number of the *Geological Magazine*, Mr. John Hopkinson, F.G.S., describes and figures several new species of graptolites. The first is named *Corynoides gracilis*, which genus Professor Nicholson regarded as allied to our recent tubularians. The other species are *Dendrograptus ramulus*, *Graptolithus acutus*, *Diplograptus pinguis*, *D. fimbriatus*, *D. Hincksii*, and *Dicranograptus rectus*. All the above new species have been obtained from the Llandeilo rocks of the South of Scotland.

"Valleys, Deltas, Bays, and Estuaries" is the title given by Dr. Ricketts, F.G.S., to his presidential address to the Liverpool Geological Society. The doctor is well known as an ardent and enthusiastic field-geologist, and this address proves he is equally well up in the literature of the science, and knows how to apply its principles to his own observations.

The Glacial Period in Ireland.—Messrs. Kinahan & Close have just published a little work on the "General Glaciation of Iar-Connaught and its Neighbourhood," in the counties of Galway and Clare. It is accompanied by a large map, elaborately wrought, in which is shown the directions of the glacial striæ. The hardest rocks are shown to be scored, scratched, and furrowed, often to a considerable depth. The glaciating agent is believed to be *land* ice. The streams of boulders are seen to flow in every direction from a small central area. Too much praise cannot be awarded to the authors for their excellent and easily-understood map, or for the clear and logical manner with which the phenomena are briefly described.

NOTES AND QUERIES.

Potato Disease.—Does not the plan practised by Mr. E. T. Scott, Norwich, of putting sand round potatoes in planting them, tend to confirm, in some measure, the theory of the Rev. Mr. Moule, as observed by W. T. Thiselton Dyer, B.A., &c., in his paper which appeared in the last number of Science-Gossip? Again, I would ask, is it not in such counties as Cheshire, where the soil is characteristically sandy, that we obtain potatoes of the finest quality, and as a rule, too, of the healthiest kind?—*John Harrison, Newcastle-on-Tyne.*

Comments on Collecting and Setting Lepidoptera.—It is true that "there is a right and a wrong way of doing everything." I should therefore strongly advise inexperienced entomologists not on any account to set their lepidoptera in the manner prescribed by "F. E. A." in the November number of Science-Gossip, for a collection that would otherwise be valuable would, if set on flat boards, be rendered worthless. As far as appearance is concerned, I think the preference due to lepidoptera set upon boards with curved surfaces. Surely "F. E. A." is mistaken when he says that this is the old way of setting; on the contrary, the way he recommends is remarkably old, whilst entomologists of the present generation set their lepidoptera on the plan recommended by Dr. Knaggs, than whom entomologists could not easily find a better adviser in pursuing their studies. If setting lepidoptera on flat boards were the best method, I would ask "F. E. A." why the lepidoptera in our public museums are not set in that way, and also why our great authorities do not set theirs on flat boards? It is within the experience of most collectors that the wings of lepidoptera would not droop when taken off the boards if the insects were allowed to remain on for a sufficient length of time. As to wooden setting-boards, they are out of the question, as they would turn the points of the strongest of entomological pins, therefore, cork setting-boards alone should be used; but their surfaces need not be rough, for any ingenious youth can make them perfectly smooth for himself with a little care. If collecting-boxes be made of cardboard, they are liable to get broken when in the pocket, which would be very provoking if they contained anything rare. Allow me then to recommend zinc pocket boxes, the cork inside being kept moist, will prevent the specimens from becoming stiff before they can be set. And finally, if chloroform be used for killing lepidoptera, many charming specimens will be utterly spoiled, as it imparts a stiffness to the wings which cannot be remedied. A jar containing bruised laurel-leaves would be found better for the killing of lepidoptera, if a bottle containing cyanide of potassium is not obtainable.—*H. A. Auld.*

Sagacity of Birds.—A curious incident occurred the other day. A gentleman was seated in his summer-house, when he was startled by a rustling noise behind him. On looking round, he beheld half a dozen or so of common sparrows swooping down upon his cat, which was doubtless watching their movements, in the hope of a sumptuous repast. But this time Tommy was as mistaken as he was unprepared, for the birds dashed at him, and he immediately turned tail and rushed into the house; one of the plucky young birds went into the house after him, and poor unnerved Tom was found ultimately crouched in great terror beneath a bed upstairs. This is a remarkable thing, showing the sagacity in these courageous little London sparrows. It is the same species of reason doubtless discernible in horses, when they form a body-guard against approaching enemies.—*W. S. Palmer.*

Self-heal.—Can any of your readers kindly favour me with some account (including the origin of the name "Self-heal") of the plant referred to in the following quotation from Emerson's works (Bell & Daldy), vol. i., "Nature," page 235: "All over the wide fields of earth grows the prunella, or Self-heal"?—*Albert C. Keen.*

Sponge Sand.—Some of your readers who, like myself, are beginners in microscopy, may be glad to know that the sand from the bottoms of sponge-jars is sometimes full of foraminifera. The sand can be obtained from any oilman, and it is very good practice in delicacy of touch to take them out on a damp needle-point under the compound microscope without an erector. I got the hint from Davies's "Preparing and Mounting," but he only mentions spicules as being found in it.—*J. R. Davies.*

Keeping Chrysalids.—I quite concur with your correspondent H. Miller as to his mode of "keeping chrysalids." I have for some years past kept a large number of pupæ through the winter in the same manner. I prefer the sides of my cages being gauze rather than wood, as the lepidoptera can obtain a better hold of it when they emerge, and are thus less liable to fall and injure themselves before their wings are fully developed. My cages are constructed in a somewhat similar way to those of your correspondent. I obtain a box, such as chocolate is generally sold in, upon which I build up a framework with a door, and over the whole of this I glue coarse gauze. The construction of these cages is very simple, and they are of much more use than elaborate glass larvaria, as they possess the advantage of allowing a free current of fresh air to pass through them, which glass cases do not. If "hawk-moths," or other burrowing larvæ are to be fed within them, then the earth should be employed; but if the larvæ are such as do not burrow before assuming the pupal state, the earth may be advantageously omitted. I feed my larvæ in different cages, and remove them when in the pupal state, to separate ones in which I keep pupæ. I find it best to keep the burrowing pupæ in a separate cage to the others, with the earth slightly moist, and placed indoors where there is no fire.—*H. A. Auld.*

What are Whitebait?—In answer to a question put by Mr. Lathbury, Worcester, respecting whitebait, allow me to send you the following extract from a *résumé* of the researches of Dr. A. Günther, of the British Museum, given at one of the meetings of the Zoological Society, concerning the distinctions between the different fish of the Herring family. The British species of this important group are the Herring, the Sprat, the Pilchard (which is identical with the sardines of the French coast), and the two species of Shad. These species are readily distinguished from one another by the numbers of their vertebræ and that of their scales, the relative position of the fins and that of the teeth. One of the most important results arrived at by this eminent ichthyologist is the absolute identity of the whitebait and herring. In the last volume of the "Catalogue of Fishes in the British Museum," Dr. Günther describes the whitebait as a purely nominal species introduced into science in deference to the opinion of fishermen and gourmands, and states that all the examples of whitebait examined by himself were young herrings. The late Mr. Yarrell, who has been followed by most naturalists, regarded whitebait as a distinct fish; but the circumstances that it has the same number of vertebræ (56) as the mature herring, the same number of lateral scales, and an identical arrangement of fins and teeth—a combination of characters found in no other fish—prove conclusively that it is the young or fry of the herring; moreover, an adult whitebait in roe has never been discovered. With regard to the effect on the supply of herrings occasioned by the destruction of the young fry, it is probable that the number of eggs deposited by the mature herring is so large and disproportionate to the number of fish that attain maturity, that a capture of a portion of the fry could have no appreciable result in diminishing the multitude of mature fish.—*John Reynolds Salter.*

Queen of Spain Fritillary.—It may interest some of your readers to learn that I have taken three specimens of the Queen of Spain Fritillary in the neighbourhood of Deal, in the beginning of October, two at Kingsdown near Walmer, and one among the Sandhills.—*H. B. G.*

South London Entomological Society.—The members of the South London Entomological Society intend to hold their first annual Exhibition on Thursday, Dec. 12, 1872, at Dunn's Institute, Newington Causeway. Open from 7 till 10 p.m. Admission by tickets only, which entomologists can obtain free from any of the members or from the Secretary, *J. P. Barrett*, 33, *Radnor Street, Peckham*, by forwarding stamped envelope.

Compass-flower.—Longfellow, in his beautiful poem "Evangeline" makes mention of the "compass-flower" as a plant to be found growing in the prairies of North America:—

> "'Patience!' the priest would say; 'have faith, and thy prayer will be answered;
> Look at this delicate plant that lifts its head from the meadow,
> See how its leaves all point to the north as true as the magnet;
> It is the compass-flower, that the finger of God has suspended
> Here on its fragile stalk, to direct the travellers' journey
> Over the sea-like, pathless, limitless waste of the desert.'"

It would be interesting to me, and I think to others also of the readers of Science-Gossip," if, out of your many correspondents, some one could say whether such a plant is known, and if so, to give its botanical name, and also the claims it has to the useful properties attributed to it by "Father Felician;" or, does the flower exist only as a creature of the poet's brain?—*James Pearson, Milnrow.*

Hedgehogs and Chickens.—In reply to the inquiry of Mr. W. H. McLachlan, "If the hedgehog was the author of their death?" I beg to inform him he doubtless was. Old hedgehogs are destructive to small game or chickens. When staying at Catton (Norfolk) last year, my attention was called one night to the very excited state of one of the hens and the plaintive cry of her chickens. My brother went down, but failed to discover anything, as he did not lift the coop. About an hour afterwards I was awakened by the same sounds. On going down myself I lifted the coop and freed the hen, and then discovered, in one corner, a large old hedgehog and under him two young chickens partially eaten. Of course I killed him, and the hen reared the remainder of her brood in peace.—*B. G. Cubitt.*

Paste Eels.—I have some Paste Eels, and should like to know if there is any way of drying the paste, so that the eels could afterwards be generated from it.—*A. P. S.*

Insects on Ferns.—I had my ferns eaten off last year by insects. I asked several friends the best way to destroy them, but got no satisfactory reply: the same occurred this month, when I procured some Scheele's prussic acid, put it into a cup under the glass case, and, I am glad to say, it has killed them all. I mention this as others may have the same difficulty. The acid being a strong poison, there may be some difficulty in obtaining it; but any chemist would supply it for you.—*Thos. Buck.*

Spenser's "Herneshaw."—In the seventh canto of the sixth book of Spenser's "Faerie Queene" these lines occur:—

"As when a cast of faulcons make their flight
At a Herneshaw, that lyes aloft on wing,
The whyles they strike at him with heedlesse might,
The warie foule his bill doth backward wring."

What bird under the name of "Herneshaw" is here referred to, and what is the *origin* of its name?—*H. Hudson.*

Stings of Wasps and Bees.—In Dr. Mills's paper on "Stings and Poison-glands of Bees and Wasps" (Science-Gossip, 1868, p. 148), he refers to the method in which the poison from the bag reaches the sting, passing down a groove between the two lancets. From a preparation I made the other day of the sting of a wasp, I am inclined to think that a tube runs along the whole length of the lancet from the poison-bag, with branches to three or four teeth nearest the extremity. Can any of your readers throw any further light on this subject?—*R. H. N. B.*

The Camberwell Beauty.—A fine specimen was secured, on the 15th September, so far north as the Forest of Glen-Tanar, Aboyne, Aberdeenshire.—*Wilcebe.*

Electrical Excess.—Can any meteoric cause be given for the great amount of electricity which this year has developed in the frequent thunder-storms which have manifested themselves?—*T. C.*

Setting Hymenoptera.—Can you or some of your readers kindly inform me which is the best way to kill and set out Hymenoptera?—*B.*

How are Eels Bred?—Perhaps some of the readers of Science-Gossip will be able to enlighten me on the generation of eels. I have caught them at every season of the year, and never yet met with any sign of ova or spawn in any one, and the question is, are they oviparous or viviparous? According to the "Naturalist's Cabinet," a work published at the beginning of the present century, they are viviparous, although other writers say the contrary. They appear to migrate to the sea (or rivers at least) at certain times of the year, as large quantities are taken in nets and coops in various parts, when the streams are swollen; but I can never detect any sign of spawn at those times, and again in the spring-time myriads of the "fry," as the young eels are called, can be seen winding their way against the stream in almost every brook or stream throughout the country.—*Henry Bennett.*

Preserving Lizards, &c.—Is there any method of preserving lizards, slow-worms, &c., besides keeping them in spirits? They are too small for my clumsy hands to stuff, and yet I should like to mount them in cases along with butterflies, &c. Any help through the medium of Science-Gossip would oblige.—*C. Kilmister.*

Dyed Sections of Wood.—Having viewed with much interest some dyed sections of wood under the microscope, would some of the readers of Science-Gossip kindly give me the best method of dyeing them?—*T. R.*

Whitebait.—In reply to the query (p. 263) on the individuality of whitebait (*Clupea alba*), I think there is now no doubt of its distinctness. Yarrell is decided on the point; at least I think, speaking from memory only, he is so. It is, however, quite possible that many of the young fry of the other *Clupeæ* are taken and consumed together with *alba*. It has been a much-disputed question in its time, the points of difference being so minute.—*E. B. Kemp-Welch.*

Phosphorescence (p. 262).—The appearance described by "A. B. C." is by no means of uncommon occurrence. I have frequently observed it, and briefly alluded to it in Science-Gossip some years ago (*see* vol. v. p. 143). I have also recently noticed phosphorescence in walking over peat bogs at night, the light, as in the former case, only appearing where a disturbance of the wet surface of the bog had taken place, as by the pressure of the feet. Disturbance generally seems favourable to the development of the light of this phosphorescent matter, or *Noctilucine*, as it has been called, from whatever source it originates; the light of the glow-worm even shining more brightly when the animal is touched, in this case, as also in the hydroid Medusæ, perhaps from irritation. The lightning, in the instance mentioned at p. 262, can scarcely have had any connection with the phenomenon; but sometimes it is apparently otherwise, for at the commencement of a storm, after continued fine and calm weather, the whole sea may occasionally be seen to be brilliantly illuminated with sparkling points of light. Here, again, disturbance, and not electrical influence, seems to be the cause of the development of the phosphorescent light. The subject is one which might well repay careful investigation. A frequent source of phosphorescence in the sea, the *Noctiluca*, is figured in Science-Gossip, vol. i. p. 246.—*John Hopkinson.*

The Young Cuckoo.—One morning in August last, as I was paddling up the river Stour, near Blandford, my attention was directed to the movements of a large bird perched on a rail by the side of the river. As I came near, I discovered it was a young cuckoo: whilst I waited and watched, I saw a water-wagtail fly down and run along the rail to the cuckoo with some insect in its mouth. As my curiosity was excited, I watched the bird for some twenty minutes; and, during that interval I witnessed a repetition of the feeding process several times. Every time the wagtail approached the cuckoo, it showed its delight by waving its wings and uttering a faint cry of satisfaction. As I approached nearer, both birds flew off to the branch of a neighbouring tree, whilst the wagtail continued to supply the hunger of the cuckoo as before.—*O. H. Bennett.*

Rural Natural History.—The inhabitants of Cheshire and the border Welsh counties have another remedy (?) which they use for the cure of "*chin*-cough." *Chin*-cough, by the way, I have been told, is a name which may yet be found for this distressing malady, in old medical works even. The cure referred to consists in this. The patient must receive *something*—a stick or a stone suffices—

from the hand of "a seventh son of a seventh son." Many a poor mother have I met in Denbighshire, who had walked weary miles up a hillside with a poor wretched child in her arms, whom she was carrying to "Ellis Davis" for cure, the said Ellis being renowned as the seventh son—"seventh son and never a wench" (as they would explain the necessary unbroken succession of *sons*) "and his father a seventh son before him." There was, and always is, perhaps a little mystery necessary to be observed to render such remedies efficacious; so in these cases the said Ellis Davis was on no account to have it whispered to him that he would be applied to, nor to see the child approaching; and therefore the poor little patient was mercifully wrapped, and carefully hidden in his mother's arms until the gifted healer was reached. Indeed, I am inclined to think that, in the cure of some diseases, the mystery stands for the most important element. I was gravely told a few days ago, by a fairly intelligent maidservant that she had frequently worked the cure of warts on her hands by rubbing them with a ripe sloe, if she had been able to use it without the knowledge of any other person; and, further, had succeeded in *burying* the sloe privately. Not being able to procure a *ripe* sloe in July, she had tried another cure, viz., the inside of the pod of a broad bean: this she had used and buried in due form, when, unluckily, working in my garden, I dug up the bean pod, and thus broke the charm, and thwarted the cure of the unsightly excrescences. Can you explain the origin of the term "hollerin" as a designation of a shivering fit, or a fit of ague?—*M. B. Morris.*

Harvest-bugs.—That irritating little insect the Harvest-bug (*Leptus autumnalis*) has this year made itself felt in greater numbers, and earlier than usual in this neighbourhood. I shall be glad to know if any of the correspondsnts of Science-Gossip have noticed these facts in other places. I find in Kirby and Spence's Entomology, a similar insect is found in Brazil, abounding in the rainy season, particularly during the gleams of sunshine, or on fine days intervening. May not the showery weather we have had this summer have assisted their early development with us?—*Thomas Cape.*

Section-cutting (Screw *versus* Wedge).—A good screw, as suggested by "C. T. N.," would doubtless take up much less space, and be neater than the wedges of my machine; but his surmise that it would be found to answer a great deal better is not borne out by experience. Those who try both will not be slow in finding that the screw, however good it be, will bear no comparison with the wedge. The motion of the former being extremely slow, the substance to be cut, if it be at all flexible, or tightly packed, will not always "answer," but will resist or "gather" more or less, which, to a beginner (for whom my paper was written), is a most tantalizing obstacle. Now, on the other hand, the shock imparted to the wedge by a smart tap, projects the contents of the cylinder instantaneously and with a "truthfulness" that is well nigh perfection. I have cut a good many sections with both kinds of machines, and speak not without experience.—*W. W.*

Are Beech-trees exempt from Injury by Lightning?—In the *Standard* a correspondent recently drew attention to the apparent exemption of the beech from injury by lightning. The following extract from his letter may interest the readers of Science-Gossip, and, I hope, will also elicit information on the subject:—"Many years ago, I heard, or read, that beech-trees were never known to be struck by lightning; and certainly from that time to this I have never known an instance in my neighbourhood, nor do I remember reading of one in the daily papers. I have lived nearly all my life on the borders of a large forest, and I have known several oaks partially or entirely destroyed by the electric fluid; also a smaller number of fir, elm, and ash trees; but not a single instance of a beech-tree being so injured. We have many fine beeches in our forest, some of them almost isolated and towering far above their neighbours the oaks, so that there is nothing in their situation or height to protect them from the thunderstorm."—*J. Hopkinson.*

Clifden Nonpariel.—I have in my possession a specimen of this rare and beautiful insect (*Catocala fraxini*) brought to me all alive and kicking, taken by some young ladies on the 19th of September, in the neighbourhood of Shrewsbury. As this insect is reputed rare, I shall feel grateful to some reader of the Science-Gossip who may be interested, if he can account for its appearance in this country, or if any one else has taken it this season.—*T. Pickin.*

Larva and Ichneumons.—Can any of your correspondents tell me whether they have known a larva pierced by the microgaster surviving the hatching of the maggot?—*M. Browning.*

Larvæ of the Small Eggar (*E. lanestris*).—Mr. John E. Robson, of Hartlepool, in your August number, is under a mistake in thinking these larvæ always separate to spin their cocoons, as I have a whole nest, just as I cut it from the blackthorn, where the chief of them returned to their nest before spinning, and they are the only larvæ whose hairs have had an irritating effect on my fingers, and I have handled many hairy kinds.—*M. Browning.*

BOOKS RECEIVED.

"Canadian Entomologist." No. 9.

"Land and Water."

"Valleys, Deltas, Bays, and Estuaries." By Dr. Ricketts, F.G.S.

"The General Glaciation of Iar-Connaught and its Neighbourhood, in the Counties of Galway and Mayo." By G. H. Kinahan and M. H. Close. Dublin: Hodges, Foster, & Co.

"Colour." By Professor Church, M.A. London: Cassell & Co.

"Ninth Annual Report of the Belfast Naturalists' Field Club."

"Les Mondes."

"The Physical Geology and Geography of Great Britain." Third Edition. By Professor Ramsay, F.R.S. London: E. Stanford, Charing Cross.

Communications Received from J. M. C.—J. H. G.—J. C. H.—E. P.—C. L. W.—P. S.—W. F.—T. A. H.—H. G.—J. B. B.—R. L.—H. P.—W. S., Jun.—R. P.—A. R. G.—B. G. C.—G. M.—A. P. S.—T. B.—H. E. F.—W. F. D.—Rev. C. W. B.—M. E. W.—R. B.—J. K. J.—H. H.—J. A. G.—R. H. N. B.—C. R.—E. H. G.—J. W.—W. L. S.—W. C. B.—H. G.—A. Y.—E. J. W.—T. C.—T. R.—A. G.—J. S. M.—J. A., Jun.—P. S.—W. W. H.—W. B.—M. J. G.—T. J. B.—S. J. B.—J. R. S.—W. L. N.—J. P.—E. P. J.—T. D. S.—C. E.—H. A. A.—A. C. K.—W. S. P.—S. S.—J. H.—H. E. W.—A. W.—A. H. S.—A. G.—J. H. M.—E. C. L.—E. B. K. W.—A. S.—A. I.—J. H.—E. L.—H. A. A.—T. R.—C. K.—G. M.—W. J. H.—A. C. R.—H. B.—S. S.—H. L. K.—J. H. S.—J. P. B.—F. K.—J. C. H.—W. W. S.—T. S., Jun.—F. S.—E. W. T.—J. H. N.—H. M. J. U.—W. B.—R. H. W.—F. G. P.—J. W.—R. B., Jun.—H. B. T.—W. N.—G. R.—Dr. A. L. A.—C. L.—H. W.

NOTICES TO CORRESPONDENTS.

W. L. Sargant.—Fill a good-sized flowerpot with fresh sawdust of oak, elm, poplar, willow, or other wood (not deal or pine), put the Cossus larva into it, and cover carefully with a flat tile or slate, also closing the hole at the bottom of the pot with a similar hard substance, and leave it till next June. If not full-fed or in pupa then, give it another twelvemonth. It will not require warmth.—*C. G. B.*

M. E. W.—The insect inclosed is a *Niptus hololeucus*, a beetle of the family Ptinidæ, and always found in houses. We can give no opinion as to the name of the "Canary-coloured Ephemeral Fly" either from figure or description. Send the insect.

C. W. Bingham.—Your specimens were *Alcyrodes phillyriæ* (Halliday), belonging to a small family of Homoptera, allied to the Coccidæ, but distinct therefrom.—*R. M'L.*

T. R.—It is not at all an unusual thing for the *Viola odorata* to bloom in the autumn. A variety has been trained by the horticulturists to this, as our correspondent may observe at any florist's.

E. H. G.—The shells are—1. *Cyclas ovalis*; 2. *Pupa muscorum*. You should get Tate's "Land and Fresh-water Shells," illustrated with coloured plates and published by Hardwicke, 192, Piccadilly, at six shillings.

W. P. N.—The fungus inclosed is tolerably common. It is *Calocera viscosa*.

R. H. N. B.—The objects on the backs of leaves are—1. Eggs of a small fly; 2. on oak-leaf, the gall of a species of *Cynips*; and 3. on box-leaf, merely a colourable alteration of the chlorophyl.

C. L. Jackson.—You cannot do better than advertise your wants in our exchange column.

Mosses.—Pennycuick. Nos. 1 and 6, *Hypnum denticulatum*; No. 5, *Hypnum loreum*; Nos. 2, 3, and 4 had become detached. Better specimens than these should be sent, and they ought to be properly mounted, and not merely stuck to any sort of paper, in a random fashion.—*B.*

W. H. Warner.—The names of the beetles inclosed in the quill are:—1. *Apoderus coryli* (L.); 2. *Graptodera ampelophaga* (probably identical with *G. coryli*). The galls will be named next month. Please send us a few for further inquiry.

W. L. Nash.—The diatoms appear to be *Cocconeis scutellum*; but they are sadly intermixed with the sand. Try getting rid of the latter by gravity.

J. H. Swallow.—The objects sent us from an *Echinus* are the scales of small fishes, probably portion of a dead individual on which the *Echinus* may have fed.

H. B. G.—Your specimen was the Jersey Toad-flax (*Linaria Pelisseriana*).

Arthur Smyth.—The superstition you relate is not uncommon. For the "old sayings and doings of our ancestors," especially as bearing on beliefs associated with animals and plants, see Charles Hardwick's "Traditions, Superstitions, and Folk-lore." London, Simpkin, Marshall, & Co.

E. Lovett.—Will you be kind enough to send another specimen? Your last has got mislaid, or lost in transmission.

Arthur Goode.—It is not uncommon to find semi-fossilized wood along the Norfolk coasts. It has been derived from the "Forest Bed" that lies further to the north, at Cromer, and extends under the German Ocean. Doubtless your specimen is such.

J. A., Jun.—Your notes are in type: but unless there is special occasion, we are obliged to adhere to our rule of priority in the insertion of communications. Your wish shall be attended to.

Errata.—In Mr. Leslie's paper last month, for *Argyeus* read *Argynnis*; and for *Daplidii* read *Duplidice*. The P. D.'s also go about seeking what they can devour.

C. E.—The specimens are the dissipiments of the siliqua or seed-pod of *Lunaria*, a genus of the *Alyssineæ* group of the *Cruciferæ*.

W. J. Hooper.—The grub inclosed in box is the larva of the Great Stag Beetle (*Lucanus cervus*).

R. H. Westropp.—We are sorry to say your communication contained no vertebræ, or anything of the kind, when it reached us.

R. Barrington.—Your specimen appears to be the Alpine Milk-vetch (*Astragalus alpinus*). We can make nothing else of it.

S. A. Brennan.—The fern is perhaps *Polypodium phyllitidis*; but it is a most puzzling thing to have to name a species from an imperfect pinnule. 2. The Greater Broom-rape (*Orobanche rapum*). 3. Corn Woundwort (*Stachys arvensis*). Will our correspondents, when they wish plants named, kindly send them in *flower?* The last specimen was in a very imperfect state.

EXCHANGES.

Echini.—Will any of our correspondents who have the opportunity send us specimens of any of the British Echini, whole, for examination of the water-vascular system? Also larval forms of the above, if possible. The specimens might, after being killed in fresh water, be placed in a jar of glycerine and water, half and half, with a dash of spirits of wine added. Any expenses will be thankfully paid.—Address, Editor S.-G., 192, Piccadilly.

Eggs of the Grasshopper Warbler, Sandwich Tern, Sparrow-hawk, Kestrel Hawk, and others, in exchange for other British eggs. — Address, J. Watson, 20, Fountain Lane, Blaydon-on-Tyne.

A number of fine pupæ, including fourteen *Acherontia atropos*, to exchange for good slides well mounted.—W. Lane Scar, 24, Cecil Square, Margate, Kent.

Vampire Bat, Polar Bear, and other good hairs, for Fern Fronds with ripe spores.—E. J. Wilson, 43, Upper Cumming Street, N.

Foraminifera from Gravesend chalk for other objects mounted.—W. Freeman, 165, Maxey Road, Plumstead.

Cellularia ciliata (well mounted) for a similar good object.—Address, H. Gilbert, 45, St. George's Road, Peckham.

For a good unmounted object, a Palate of Dog-whelk, well mounted as an opaque object. Send object and stamped box to Wm. Sargant, Jun., Caverswall, Cheadle, Staffordshire.

For seeds of *Godetia*, *Collinsia Bartsæfolia*, and *Centranthus macrosython*, send stamped directed envelope and good microscopical object to Henry L Kay, Cathnor Road, New Road, Shepherd's Bush, London, W.

Wanted good specimens of British Birds' Eggs, named, in exchange for British Land and Fresh-water Shells.—Address, H. Perkins, Hill House, Sibford, near Banbury.

Good specimens of *Machaon* (a limited number), *Rhamni*, and *Adonis*, in exchange for any of the following:—*Paphia*, *Aglaia*, *C. album*, *Hyale*, *Sinapis* (female), *Rubi*, *Quercus*, *Arion*, &c. Answers in a week.—Robert Laddiman, 3, Costessey Terrace, Hellesdon Road, Norwich.

A few specimens of *Helix obvoluta* for *Paludina vivipara*, *Planorbis corneus*, or other rare British species.—E. H. Goddard, Esq., Rev. H. Moberly's, King's Street, Winchester.

Wanted, British Butterflies or Moths in exchange for specimens of the following ferns:—*Polypodium dryopteris*, *Allosorus crispus*, *Asplenium viride*, or *Cystopteris fragilis*.—J. A. G., The Elms, Banbury, Oxon.

Send stamped and addressed envelope with an unmounted object of interest for fine crystals of pure Oxalate of Ammonia, to Miss Watkins, 15, Union Street, Deptford, S.E.

Wanted, leaves of *Deutzia scabra* and *gracilis*, in exchange for rich foraminiferous Sand from Connemara, or other objects.—H. E. Freeman, 1, Rose Villas, Wood Green, N.

A liberal number of good slides of spicules and selected diatoms, for material containing any *Aulacodiscus*, *Eupodiscus*, *Isthmia*, or *Arachnoidiscus*, or for a bit of Glass-rope Sponge. —J. K. Jackson, Talbot Street, Oldbury, Birmingham.

Phyteuma orbiculare, *Gentiana amarella*, and others. For list apply to R. Payne, 12, Brock Road, Lordship Road, Stoke Newington.

British Birds' Eggs offered in exchange for *Atropos*, *Convolvuli*, *Euphorbiæ*, *Galii*, *Livornica*, *Celerio*, *Elpenor*, *Porcellus*, *Nerii*. Any of the above.—W. Bowman, Upper Willow-Hall, Warley, Halifax.

For Pollen of *Melampyrum pratense* send stamped directed envelope to J. H. Martin, 86, Week Street, Maidstone.

Cuticle of *Pæony* and Plates of *Holothuria* for other *well*-mounted objects.—A. C. Rogers, Red Lodge, Southampton.

Well-mounted Sections of Teeth offered in exchange for other well-mounted slides.—W. Nash, Stroud, Gloucestershire.

Fossils wanted, Lias, Oolitic, Mountain Limestone, or Silurian, in exchange for Norman's prepared microscopical slides and others.—S. J. Barnes, Trafalgar Road, Moseley, Birmingham.

Wings of British Butterflies and Moths for mounting, in exchange for other microscopic material.—A. H. S., 50, Arlington Street, Mornington Crescent, London.

Good specimens of *Semele*, *Corydon*, and a few of *Filipendulæ* for any one requiring them, upon receipt of a suitable box and return postage.—H. A. Auld, 62, Granville Park, Blackheath.

Wanted, Animal Parasites, Mites, &c., mounted or unmounted. Good slides given in exchange.—Address E. Lovett, Holly Mount, Croydon.

Well-mounted slides of selected Diatoms for fragments of *Hyalonema* or *Chirodota*.—G. Moore, Dereham Road, Norwich.

Portion of Wing of *Parnassius Apollo* and other characteristic scales in exchange for well-mounted slides.—T. Shipton, Jun., 12, High Street, Chesterfield.

For scales of Rock-fish send stamped and directed envelope, with object of interest, to F. S., Post Office, Rugeley, Staffordshire.

For exchange, slides of Entomological objects, &c. Send lists to H. M. J. Underhill, 7, High Street, Oxford.

L. glaber (living specimens) for other British Land and Fresh-water Shells.—H. Laver, Colchester.

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