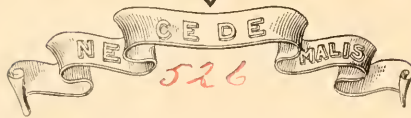
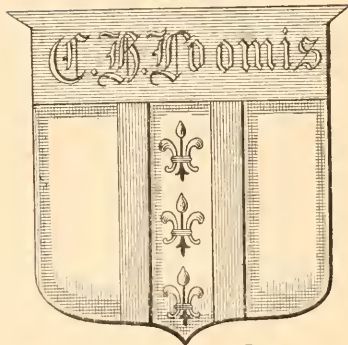


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AN ILLUSTRATED MEDIUM OF INTERCHANGE AND GOSSIP

FOR STUDENTS AND

LOVERS OF NATURE.

EDITED BY

J. E. TAYLOR, PH.D., F.L.S., F.G.S., F.R.G.S.I., &c.

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PREFACE.



O write a Preface year after year for a volume like *SCIENCE-GOSSIP*, to mean the same thing, and yet to say something new, would be a tax upon the ingenuity of the most skilful writer. Nevertheless, the Editor feels it both a duty and a pleasure to take such an opportunity of expressing his gratitude towards so many cheerful helpers, his sympathies with diligent students and inquirers with whom he has been in silent monthly communication, and his hopeful anticipations that the time to come may find him surrounded by as many friends as at the close of the eventful year 1878.

The last four years have been fruitful beyond measure in Scientific discoveries. In Physical Science, the numerous revelations have been almost startling in their novelty, and these have culminated in that simple and yet wonderful instrument, the Microphone. To listen to the tramping of insects is like hearing the "footfalls on the boundary of another world." Is it possible that the Microphone will be to organic sound what the Microscope has been to vision? Shall we listen to the love-narratives of insects as we do unaided to those of birds, or be possible hearers of their domestic squabbles?

Unhappily, it would seem as if Science, like some land of Goshen, were the only arena where Peace may find a perpetual home! For, although scientific men, as inheritors of a long ancestry of the spirit of partisanship, cannot avoid taking sides in debating the great questions which are continually raised in their unfettered investigations of natural phenomena; they do not condemn each

P R E F A C E.

other to pains and penalties for daring to disagree. No sword is here wielded, nor artillery thundered, to determine by force what calm reason finds herself unable to settle. Rather, a greater incentive to further inquiry is produced, to redoubled observation and verification of facts, and to renewed diligence in the search after truth, if haply they may find it! Will the time ever come when Politicians will condescend to follow the example of *savans*?

It is cheering to observe the wider love of Nature and the spread of scientific culture among all classes; to note how the pursuit of Science is a bright spot in the lives of toilers at the desk, the loom, the anvil, and in the field. Our position fortunately makes us acquainted with diligent and capable students, low in the scale of worldly wealth and position, whose lives are sweetened by the new interest in common things which popular Science has created for them. Long may it continue to be so, and may the day soon come when men and women will be rescued from their lower natures by the calm dignity which Wisdom bestows on those who seek her!

As hitherto, our purpose is to keep pace with modern discovery and investigation, and to throw open our columns to the recording of new facts. Not less desirous are we of helping the young inquirer, and of putting him in a way to gain higher and sounder knowledge. Whilst endeavouring to keep clear of mere gossip, we do not wish to write above the heads of our large circle of readers by essays on abstruse subjects. Our aim is to spread and popularize Science, and to encourage a love of it.

In conclusion, we heartily thank all who have helped us, and who have promised to continue their aid. At the same time, we implore the sympathies of those who are unaware of the burden of correspondence and work entailed in editing a journal like SCIENCE-GOSSIP, and who may feel aggrieved at imagined slights. To each and all of those with whom we have been in cheerful literary and scientific companionship for the last year, we wish a "Merry Christmas and a Happy New Year!"

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THE POTATO BEETLE.

A LITTLE OIL ON THE WATERS.

By V. V. ANDREWS.

Corresponding Secretary of Long Island Entomologists' Society, U.S.A.



THE occasion of the appearance of this little article is a paper which appeared in the September number of SCIENCE-GOSSIP, written by Mr. E. C. Rye.

No one will dispute the assertion that anything from the pen of that gentleman, particularly on entomology, is worthy of our serious attention, and therefore it is that I regret to see him in the ranks of the alarmists,—already, as I should judge, too well recruited.

I will assure your readers that to us, who have now for some years been familiar with *D. decemlineata*, the alarm seriously felt in the Old World lest this insect should visit your shores seems verging on the ridiculous. I do not, of course, mean that reasonable precautions should not be taken; but the idea of stopping the transmission of dead specimens through the mails, as I know has been done, and thus preventing your people from making a personal acquaintance with the insect, appears to me to have a tendency to defeat the object in view.

Certainly I should advise no Englishman to import live specimens, and I should advise all farmers and gardeners to rid themselves of the presence of the beetle, as I should advise them to rid themselves of a crop of thistles. But if they imagine that its existence in their fields is likely *seriously* to injure their crops, then I assure them that they are very much mistaken. We have had this beetle on Long Island in immense numbers for some years, and I do not believe that any one has suffered any appreciable loss through its depredations. Farmers all say this.

If any loss have been sustained, it has rather been through the remedy used than through the disease. And here let me earnestly advise my countrymen—for I am an Englishman—if the beetle should make its appearance in the tight little island, to *use no Paris green*, or other poisons, with a view to its extermination. There are two or three sufficient reasons why such remedies should not be used:—

1. Its application, in any form, is not without danger. If it be dangerous to wear green silks or to use green paper for walls, it surely must be injurious to apply this poison in any way by which its entrance into the human system is rendered possible, and probable.

2. The first shower of rain or gale of wind will remove every particle of the powder from the foliage of the potato, and either disseminate it through the atmosphere or imbed it in the soil, to be stirred up by the hoers or diggers.

3. Its use is entirely unnecessary. For small plots of land hand-picking by boys or girls is efficacious and without danger (for I do hope that your readers are not believers in the foolish stories told of the beetle being poisonous). For larger lots an ordinary butterfly bag-net, swept gently along the potato-tops, will capture more beetles in an hour than Paris green will kill in a week; and, by the way, recollect that Paris green will kill other things besides potato beetles. An American farmer applied a pretty good dose of this poison to the potatoes in his garden "one dewy eve," and on the next morning found four dead milch-cows in his pasture. The cows had broken into the garden, and—increased the quantity of beef in that vicinity.

Mr. Rye tells you that Paris green is a favourite remedy here, but he does not understand the American mode of doing things. Some State entomologist or other probably had a friend in the oil and colour

business, and gave a friendly puff to Paris green. Then the oil-and-colourman advertises in some agricultural papers that he has the "never-failing exterminator" of potato-bugs—Paris green, and the editor of that journal at once *strongly* recommends it. You do not do things in that way in honest old England, but we do here.

One word of advice. When your potatoes are four or five inches high, just occasionally turn up the leaves and examine the under side. If you find a bunch of orange-coloured eggs, nip them off. They probably were deposited by *D. decemlineata*. In a week or so look again. If you find that the foliage has been eaten from a plant pretty thoroughly, and should find a dirty brick-red animal, like that figured by Mr. Rye, on that plant, remove the animal the way I have advised. It is the beetle in its larval state; and, recollect, that in that state it does most of its eating. But it is a poor traveller, and does not wander about unnecessarily. So, when you have found one from a batch of eggs, you may be sure the others are near at hand. One stroke from the net will capture most of them. Work attentively, now and again, and your potato crop will not suffer. Recollect, however, that other things besides *D. decemlineata* eat potato vines. Here we frequently suffer from the attacks of the *Lyttas*, or blister-beetles, which devour lots of potato foliage.

Caution! Mind, that all striped beetles found on potatoes are not Colorado potato beetles, but may be useful little fellows, whose larvæ devour other larvæ injurious to us.

THE PRONUNCIATION OF SCIENTIFIC NAMES.

IN regard to the pronunciation of Latin and Greek, perhaps the confusion of theory and practice is greater at the present time than it has ever been. The attempt to give *c* and *g* the hard (guttural) sounds in all such words is really only a part of a much wider scheme, which aims at restoring, as far as possible, the actual pronunciation of the ancients themselves. If these actual sounds can be recovered with any certainty, there is a possibility that some time Latin and Greek will be pronounced in a similar way by all who learn them, to whatever nation they belong. This is only what is done, as a matter of course, in the case of all other tongues, and no reason could be assigned for adopting a different practice in this instance. Prejudice stands in the way, but we need not despair of overcoming it. When I began to learn Latin, I was told that when I travelled in a foreign country, the language of which was unknown to me, I should be able to communicate my wants to any well-educated man by expressing them in Latin. In writing, of course, this could always be done, as, in fact, it is in the correspondence of many scientific

men of the present day, especially those who belong to the Russian, Swedish, and other nations, whose languages are not generally known. But if two of these *savans* met, they would be as entirely unable to communicate orally with one another as if they knew no Latin at all—a result which I have no hesitation in calling ridiculous.

But is there any possibility of recovering the actual sounds used by the Greeks and Romans at the time of their greatest literary prosperity?—the last clause being necessary, because their pronunciation changed with time, as ours has done. This is not the place to discuss the question, but the attempt has been made, and, I believe, with success; not with absolute certainty, perhaps, but sufficient to remove, at any rate, most of the difficulties in the way of the adoption of a universal standard. It is no objection to this proposal to say that the people of each nation are incapable of pronouncing certain sounds. This is not true, so far as relates to the languages with which we have practically to do. No Englishman, for instance, if *properly* instructed, can fail to learn the sound of the German *ch*, or the French *u* or *eu* in a short time, and practice will then make it easy. Moreover, the number of *sounds* peculiar to each nation is much exaggerated. The French, it is said, have a dislike to the sound of *w*. It would not be difficult, were this the place for doing so, to make out a long list of words which every Frenchman uses, in which this *sound* occurs, though not the *letter*. Conversely, the so-called peculiar vowel-sound of the word *cueillir* has its exact counterpart in English words.

Although the time is not ripe for the adoption of the above-mentioned scheme in its entirety, there is one feature of it which will form a good step in advance, and which may be at once accepted. This is the absolutely certain fact that *c* and *g* should invariably have a guttural sound. I am not speaking of the attempt to make this rule apply to English words derived from classical roots. *That is quite a distinct subject*, though it is not always kept distinct. Scientific names are Latin words, and should be so pronounced. The case of *Geranium* and the like will be no obstacle, for it is easy to pronounce the *g* hard when we speak of *Geranium molle* to a fellow-botanist, and soft when we speak to a lady-friend of the geraniums in her conservatory. This is no more than is done every day by people who can speak more than one language. They do not, for instance, give the same sound to *ball* in English, and *ball* in German, because they are spelled the same, and are names of the same object: and similarly with the French and English *point*.

With reference to the pronunciation of words derived from names of persons and places, it will be only consistent to insist that they shall be sounded according to the rules of the language from which they are taken. In so far as they are neither classical words nor derived directly from classical sources,

there can be no reason for pronouncing them as such, even if it were not sometimes impossible to do so. I feel sure every botanist, meeting with one of these strange-looking words, would rather give it the proper sound than attempt to pronounce it according to English rules, with a result which, he is painfully conscious, is absurd. What is wanted, is a compendious and handy guide to the sound of the letters in the chief foreign tongues, such as French, German, Italian, Swedish, etc., and even Russian. It will be found that the sounds which do not exist in English are very few, and plain directions can be given for the attainment of most of those. Were such information commonly disseminated among scientific men (and perhaps SCIENCE-GOSSIP would be a good place for it to appear in), we should cease to hear such barbarisms as *Hyppium Swartzii*, with the *w* pronounced as in English, and *Veronica Buxbaumii*, with the *au* as in the English *haul*. It would be found, too, that the trouble required would not be great. Merely to learn how certain consonants and vowels are sounded in a language, is a very different thing from learning the language itself.

W. B. GROVE, B.A.

A DOMINIE'S BOTANICAL HOLIDAY.

WHAT a grand thing it is to have a holiday, and how refreshing to live almost out of doors for a whole month; to wander hither and thither fancy free, by the brookside, or amid the tangled mazes of the wood, to ascend to the top of yonder hill, or to find out a path for ourselves through the glen—to climb the rock by the sea-side, or to lie on one's back on the thyme-covered bank above! With some such thoughts did I awake one morning in the summer-time of last year. My holiday I intended this year to spend in the west of Scotland, and once on board the *Marmion*, with the "guid braid" Scotch tongue all around me, I fancied myself there at once. The weather was beautiful, and the good ship *Marmion* steamed away right merrily for the North. As we reached Flamborough Head we had a good view of the land, and all the way from this point the objects of interest were noted by tourist passengers.

All this time I am on the sea, and as I cannot do much in a botanical way on board of a steamer, I live in a sort of poetical dream, in which the characters in "Marmion" are all chasing each other through my brain. At length we arrive at our destination, and saying good-bye to the steamer, I pay a short visit to "Auld Reekie," my Alma Mater, and in a short time find myself *en route* for the west.

On arriving at A——, my botanical rambles at length begin, and I am soon in the full enjoyment of the pleasures I had looked forward to. Over most

of the ground I had already made excursions as a boy. Then my pursuit savoured somewhat of ornithology, now in manhood's day I was a humble student of the beauties of Flora's domain.

Several of my rambles on this occasion I shall always remember with pleasure, and one of those in the foremost rank would be that visit to the Carrick country. Who does not admire the purple heather of our Scottish hills? Now I was able to make a distinction between the commonest kind of all—Ling or *Calluna vulgaris*, and the different kinds of Erica which grow together on the hill-side, and a new pleasure seemed to be mixed with my boyish love for the "dark purple heather." The Blue-bell (*Campanula rotundifolia*) is to be found gracefully nodding its head to every little breeze, and seeming to bring up memories of "auld lang syne," and, although I can remember it as one of the most delightfully common of little flowers of my boyhood, I can also remember the words of Ellen, the "Lady of the Lake," that—

"It drinks heaven's dew as blithe as rose
That in the king's own garden grows."

A wealth of hillside flowers is to be found around me, such as the pretty little Eyebright and the Creeping Cinquefoil, with its relative the common Tormentil. Moving on a little on one side I come across two of Our Lady's flowers—the Lady's Mantle (*Alchemilla vulgaris*), and the *Galium verum*, or Lady's Bedstraw, or Beadstraw. Getting into a part where the ground is somewhat moist and boggy, the lovely *Parnassia palustris* soon rivets attention. What a splendid view from the top of the hill! Right away to the Irish coast almost, on one side, and around me I can survey the whole extent of country where

"Bruce he shook his Carrick spear."

Another very enjoyable ramble was the one paid to Loch Doon, the birth-place of the "bonnie Doon." This was accomplished by going by rail to Dalmellington and walking to the loch. The walk by the side of the Doon is a magnificent one, and as the glen gets narrower and the rocks higher I am fairly enraptured with nature's works. At length I emerge from the glen with pleasant thoughts of the beauty of the ferns and mosses which I have seen peeping out from the crevices of the rocks and adorning every spot of vantage. Keeping company with the Cryptogamia I had also observed quantities of that pretty saxifrage the London Pride, or "None-so-pretty," and the Crow Garlic, with its beautiful star-like blossoms, and its leaves somewhat resembling those of the Lily of the Valley. Having got safely through the glen, I find myself on the borders of a wild high-land lake, studded here and there with islets. Being desirous to change the walk, I reach Dalmellington by a different route, and as I have to pass through many acres of bog-land, my old friend the *Parnassia*

palustris is found in great plenty. The *Ericas* also look well, and I am constrained to gather some of them. I also find the Milkwort, or Rogation flower, in great plenty and very various in its hues. Dalmellington is at length reached after a long ramble, and I am glad of a little rest after my labours.

The flowers on the Ayrshire coast are very numerous, and an excursion for the purpose may be made with advantage by any one who may be

Clyde, the scene of my operations for the remaining part of the time. Crossing one morning from Ardrossan in a little steamer, I arrive at Brodick, and at once start for a walk across the island. Having got right to the other side I proceed to arrange about a lodging, and as I am out of the way of all bustle I make up my mind to enjoy myself. I could soon see that I was looked at, as I thought, with some degree of patronage by the natives. In order to encourage me several hoary islanders used to



Fig. 1. Grass of Parnassus (*Parnassia palustris*).

interested in wild flowers. The Sea Convolvulus and the Rest Harrow, with the Scurvy Grass and the *Eryngo Maritimum*, may be found here in great plenty, besides hundreds of other well-known plants. A great many varieties of the most beautiful of the Algae may be gathered on the sea-shore after a storm.

After spending about a fortnight on the mainland I determine to make the Isle of Arran, in the Firth of



Fig. 2. Round-leaved Sundew (*Drosera rotundifolia*).

appear with immense bundles of weeds round the cottage where I lodged, about eventide. As the evenings were fine I used to take a chair out of doors and hold a sort of reception. It was to me very amusing to observe the specious pretexs by which these "ancient mariners" used to lure one to talk when they found that I could tell them about London; and how desirous they were to know all about it. Almost every evening I might

expect one or more of my friends coming to visit me, and to hear something more about the "big ceety." In the daytime I enjoyed my rambles exceedingly, and I came across many specimens here that I had not seen for some time. The lovely Alpine Lady's Mantle repaid a climb up one of the hills, and in the boglands below I found the *Drosera rotundifolia*, and its usual companion the *longifolia*. Another carnivorous little plant which is often a near neighbour, one of the Butterworts,



Fig. 3. Purple Loosestrife (*Lythrum Salicaria*).

I also found in the same neighbourhood. One part of the bog I found quite covered with the Cotton Grass, and close by a great deal of the Marsh Cinquefoil, which, although it has done flowering, I am able to make out by its strawberry-looking seeds. Another part of the bog I find covered for a great distance by the Horsetail (*Equisetum*), and in the running stream by the side, its representative the *Hippuris*. The Bog Bean is

also present with its tripartite leaf, but it is now destitute of flowers, and in close proximity is the Marsh Valerian. Before leaving the moist ground I feel called upon to admire the beauty of a large patch of the Purple Loosestrife, which has a grand effect.

It was after one of my excursions, and whilst I was holding my usual evening "confab" with my friends, that one of them confided to me that "a wee drap o' Luckie Findlay's whusky wad be a guid thing to carry wi' ane oot on tha hills." I told him that it might or it might not, but as I did not want it for the purpose of quenching thirst it would be a useless encumbrance. I saw that Donald looked quite astonished at my temerity to venture to speak slightly of what was to him, no doubt, a sovereign remedy for everything whatever.

It was only a day or two after this that I took my farewell ramble in Arran. It was not the best of days, and the weather seemed to be breaking up. As my holidays were now drawing to a close, I was not so much concerned on the subject. In this, my last excursion, I came upon the *Osmunda regalis* in a boggy piece of ground. It was growing up in several clumps, and looked very well indeed. After this I also came across the Sweet Gale, or Bog Myrtle. It was about here in great profusion, and smelt very strongly of the myrtle-scent belonging to it. A little farther on amongst the Sheep's-bit Scations and the heather, both purple and white, I found for the first time the pretty Bog, or Lancashire, Asphodel. Another plant which I found for the first time was the pretty White Sedum, down on the rocks by the beach. Though I have often gathered these two plants since, this was my first introduction to them, and I shall always remember them in connection with the "Misty Isle of Arran."

J. MILLS HIGGINS.

TAME BEARS IN SWEDEN.

BY JOHN WAGER.

IT is well known that the Bear, by a course of severe discipline, can be taught to carry a long pole in his paws or a pert monkey upon his back, to dance to the music of pipe and drum, and to perform tricks which the solemn gravity of his demeanour, his clumsy motions, and shaggy hide, render the more amusingly grotesque. He may also be seen, in the den of a menagerie, to leap through a comparatively small ring encircled with flame, associated, during the performance only, with leopards and a hyæna; though the uncouthness and reluctance with which he accomplishes the feat, contrasted with the graceful and ready spring of the leopards, is enough to make the hyæna laugh; while, of all the performers, he has evidently the most intractable temper, and is least trusted by the spangled damsel who presides with the whip.

Yet, when young, the Bear is not altogether devoid of amiable qualities, as the following narrative will prove. The account was communicated to the present writer in 1867 by a Swedish acquaintance residing at Mora, in Dalecarlia, the bear being then living, and the property of a gentleman at Siknäs, in Venjan, an adjoining parish, having been taken when about three weeks old from the adjacent forest in February, 1865. Being fed with warm milk, young Bruin thrived satisfactorily, and when large enough to enjoy liberty he usually sojourned in the yard with the bear-dog "Jeppe," playing and springing about his companion like a cat. He was also much attached to his master, delighting to accompany him not only to the forest, where he often clambered up trees, but also into the house, where removing chairs and tables from one room into another appeared to be his favourite occupation. Strangers who visited Siknäs always received his attentions; but as these were somewhat brusque, and expressed in a surly tone, they tended rather to repel than attract.

To Swedish punch (a luscious compound of arrack and sugar) he was extremely partial, and partook of it, whenever invited, out of a glass, like a well-bred gentleman, but afterwards showing his loutish and lumpy nature in a drunken fit, concluding with heavy sleep and loud snores.

One day, while Bruin was yet of tender years, a kitten came into the yard and immediately drew his surprised attention upon herself; but young Puss, not admiring his looks, first cast upon him an angry glance, and then sprang up and fixed her claws in his head, exciting such alarm that he trotted off in a nervous perspiration, and ensconced himself in an outhouse. Subsequently he always fled at the sight of this cat, though she was the only one of which he showed fear.

Bruin took a daily bath in the river, which flows within a stone-throw of the house; swimming across and back again. He then trotted to an ice-cellar, the roof of which was easily accessible and covered with deal boards, one of which projected considerably beyond the rest; towards the end of this he used to creep warily, to enjoy the swinging motion that resulted. It was a mode of recreation of which he frequently availed himself.

Whenever he could intrude into the kitchen he bemeaned himself like an officious and meddling husband, disordering affairs, greatly to the vexation of the domestics, to whose castigations with a stout knob stick he payed little regard. One day he laid hold of a coffee-pan that stood on the hearth, and was conveying it in his paws to the yard, when the hot contents, overflowing on his bosom, provoked him to cast it on the ground and flatten it with a stroke of his paw. He would also, when opportunity occurred, smuggle himself into the larder (a detached building), looking round first to see that he was not observed, then bring out some article, especially a cheese, which he found convenient to carry; but on one occasion he

made free with a tub of *clouted* milk and cream, handling it, however, so awkwardly that the ropy tenacious contents streamed down the front of his erected corpus, and, as in the case of the coffee-pan, brought vengeance on the tub. After fruitless endeavours, with tongue and claws, to clear the viscous mass from his best fur coat, he betook himself to the river, and then solaced himself with a swing.

This partiality for swinging or rocking rendered him an undesirable companion in a boat; yet he constantly followed his owner to the river-side, and if not admitted as a passenger, would swim after the boat, grunting like a hog. During one river excursion which he had been allowed to share he enjoyed as usual his rocking, till the boat, gliding down the river, entered a stormy rapid, when he became quite agitated with fear, trembling in every limb and holding on each side of the boat so long as it remained in the weltering force. When indulged with a ride by land, he would sometimes leap on the shafts of the vehicle, and placing a hind leg on each, rest his fore paws on the horse's back.

As he grew older it was found necessary to impose some check upon his movements, and for this purpose a chain, with a log at the end of it, was attached to a collar round his neck. Such badge of servitude and interference with the liberty of a free-born bear was not to be borne. At first he tried to strike off the log with his paws; then he dragged it to the river, but was vastly irritated to find that after every attempt to sink it, the audacious log came to the surface again. Finally he dug a hole, put the log into it, and replaced the earth, stamping or pressing it down; then apparently satisfied with his work he attempted to move off, but found himself in a worse fix than before; however, after sundry curvets and angry jerks the chain broke and he regained his freedom, leaving his encumbrance in the grave.

In concluding his ursine anecdotes my Swedish friend remarked: "These are but a few of Bruin's traits and droll tricks, which must be seen to be fully enjoyed. At present he lies quietly in his winter lair, but imagine his humour when he leaves it in spring; he is then no agreeable companion, especially for the kitchen-maids, towards whom, and the fair sex in general, he shows the greatest disregard."

Poor Bruin! he must indeed have got up on the wrong side of the bed, for he became so unbearably troublesome and subject to such angry moods, that, as I afterwards learned, at the early age of about three years he was doomed to death, and executed accordingly.

Another young bear, captured in the winter of 1869, was kept for about two years at Ekshärad, in Wermland; but as it grew older it became dangerously ferocious, and, consequently, was also shot. A tame bear, kept at Snö-an, had accidentally one Saturday evening got locked up in the smithy, and not liking to remain in a workshop on a Sunday,

attempted to escape through an opening in the roof. But to reach this Bruin had to clamber upon a lever, which, under the pressure of his weight, opened the sluice-gate, and, turning the water upon the wheel, set the great hammer to work. Evidently annoyed by its persistent motion and noise, he appears to have grasped the hammer in his paws with intent to stop it; but the contest proved beyond his strength, for the neighbours, hearing loud roars, hastened to the smithy and found him lying upon the anvil, having received a death-blow before their arrival.

THE SEALS AND WHALES OF THE BRITISH SEAS.

PART VI.

By THOMAS SOUTHWELL, F.Z.S., &c.

WE now come to the second sub-order into which the Cetacea are divided, namely, the *Odontoceti*, or Toothed Whales. In this section, baleen is never present, but well-developed teeth are found in one or both jaws of the adult; in some species they are very numerous; sometimes, though rarely, deciduous. The blow-hole is single, and the skull generally asymmetrical, or not precisely alike on both sides of the medial line. Professor Flower divides the *Odontoceti* into three families, one of which, the *Platanistidae*, as already said, is found only in India and South America; the other two, *Physeteride* and *Delphinide*, are represented in our Fauna by about fifteen species.

Of the *Physeteride*, four genera are represented in the British Fauna by five species; namely, one *Physeter*, the Sperm Whale; two *Hyperoodon*, the common Beaked Whale, and a very rare species called the Broad-fronted Beaked Whale; one *Ziphius*, Cuvier's Whale; and one *Mesoplodon*, Sowerby's Whale.

By far the most interesting species is the SPERM WHALE, *Physeter macrocephalus* (Linnæus), which rivals the Right-whale in commercial importance and in the value of its products. This species has a very wide geographical range, having been found in almost every sea between lat. 60° north and 60° south. The attempt has been made, I think unsuccessfully, to show that the Sperm Whale of the southern hemisphere is distinct from that of the northern; there seems, however, no reason to doubt at present, although, of course, it may eventually be found otherwise, that the same species of Sperm Whale ranges over the whole of this vast tract of ocean. North of about 40° it appears to be only a straggler, and although the Arctic seas are almost always stated by authors to be its head-quarters, no well-authenticated instance of its occurrence farther north than Scotland is on record, and Lilljeborg excludes it from his account of the Scandinavian cetacea. Of its occur-

rence on the British coast there are numerous instances; in all cases, however, they are believed by Andrew Murray to have been stragglers, "which have rounded Cape Horn (they have never been known to double the Cape of Good Hope) or unpromising colonies, for they are becoming scarcer and scarcer in more than their due proportion."* Of the numerous occurrences on the coast of the British isles I shall confine myself to a few early records.

In the church of St. Nicholas, at Great Yarmouth, is the basal portion of a skull of this animal, which has been converted into a chair: it formerly stood outside the church, and of course, as it was an object of wonder, it was relegated to the powers of darkness, and christened (?) the "Devil's Seat"; it has, however, now been admitted into mother church, and stands beside the north-west door under the clock. Mr. C. J. Palmer tells me that in the churchwardens' accounts for 1606 there is a charge of 8s. for painting this chair, which clearly proves its antiquity. Sir Hamon L'Estrange, in a letter to Sir Thomas Browne (Wilkins's edit., 1852, editor's preface to "Pseudodoxia," vol. i. p. lxxxi.), says that in June, 1626, a whale, afterwards referred to by Sir T. Browne as a sperm whale (vol. iii. p. 324), was cast upon his shore or sea-liberty, "sometyme parcel of the possessions of the Abbey of Ramsey, &c." The same author, in his account of the "Fishes found in Norfolk and on the Coast," says, "A Spermaceti whale of 62 feet long [came on shore] near Wells, another of the same kind twenty years before at Hunstanton [the one referred to by Sir H. L'Estrange]; and not far off, eight or nine came ashore, and two had young ones after they were forsaken by the water." The whale mentioned by Sir H. L'Estrange came on shore in 1626: twenty years after would give 1646 as the date of the Wells specimen; and in December of that year, according to Booth's "History of Norfolk," published in 1781 (vol. ix. p. 33), "A great whale was cast on the shore here [at Holme-next-the-Sea], the wind blowing strongly at the north-west, 57 feet long, the breadth of the nose-end eight feet, from nose-end to the eye 15½ feet; the eyes about the same bigness as those of an ox, the lower chap closed and shut about four feet short of the upper; this lower chap narrow towards the end, and therein were 46 teeth like the tusks of an elephant; the upper one had no teeth, but sockets of bones to receive the teeth: two small fins only, one on each side, and a short small fin on the back; it was a male . . . ; the breadth of the tail, from one outward tip to the other, was 13½ feet. The profit made of it was £217. 6s. 7d., and the charge in cutting it up and managing it came to £100 or more." It seems probable that a "school" got bewildered in the shallow waters of the Wash, and that the individual of which Booth

* "Geographical Distribution of Mammalia." By Andrew Murray, 1866, p. 217.

gives such an excellent description, formed one of the same party as the eight or nine mentioned by Sir T. Browne. In May, 1652, Mr. Arthur Bacon writes to Sir T. Browne about the sperm whale cast on shore at Yarmouth, but the actual date of the occurrence is not given. This is the last record of this species being found on the Norfolk coast, with which I am acquainted: it has, however, occurred many times since, singly or in small parties, on other parts of the coast; the last instance, I believe, being in July, 1871, when one was stranded on the shore of the Isle of Skye. Of the osteology of the Sperm Whale, Professor Flower has given an exhaustive account in a paper published in the "Transactions

very remarkable appearance, the truncated form of the snout looking as though it were cut off at right-angles to the body: at the upper angle is situated the single blow-hole. The juncture of the head with the body is the thickest portion, and the body decreases little in size till the "hump," which is situated in the place of the dorsal fin, is reached; from this point it rapidly diminishes to the tail. The flukes of the tail are from twelve to fourteen feet in breadth, and the two flippers each about six feet long. The under jaw is pointed, and about two feet shorter than the upper; it is furnished with about twenty-five large conical teeth on each side; but the number is not constant, nor is it always the same on each side. In

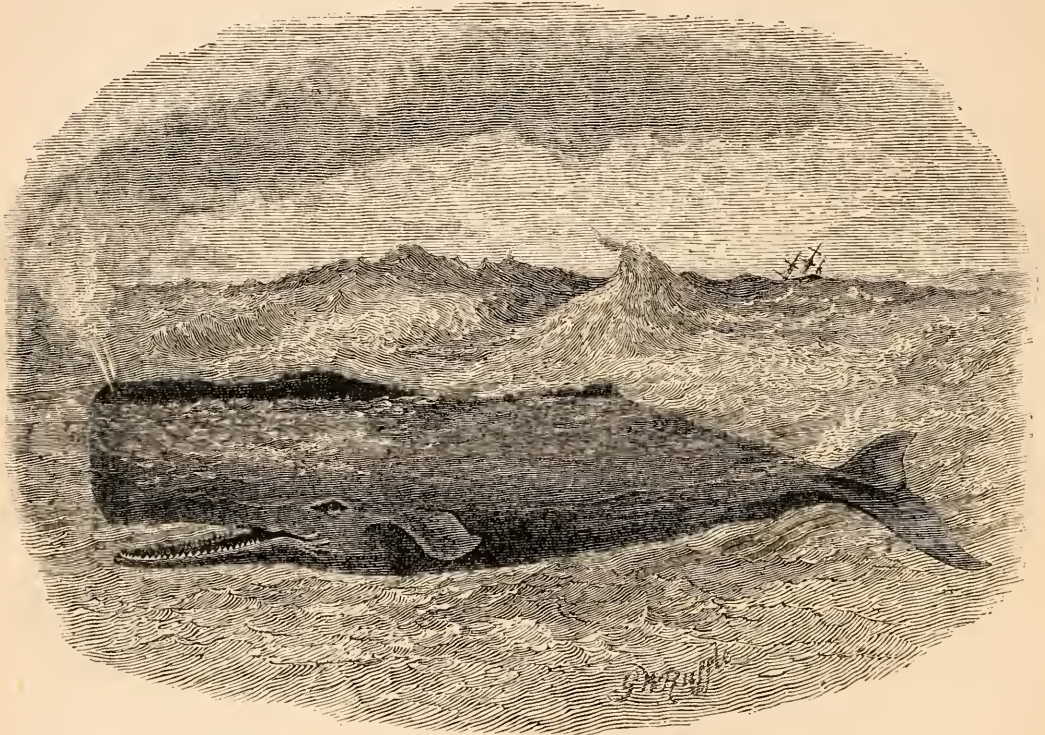


Fig. 4. Sperm Whale (*Physeter macrocephalus*, Linn.).

of the Zoological Society," vol. vi., and of its habits a very interesting account is given by Thomas Beals, who, in the capacity of surgeon on board ships employed in the South Sea fishery, had unusual opportunities of observing this remarkable animal. He published a book entitled "The Natural History of the Sperm Whale," to which I am largely indebted for what I shall have to say about this species.

The colour of the Sperm Whale is black above and grey beneath, the colours gradually shading into each other. The full-grown male is about sixty feet long; the females are much smaller and more slender than the males. The head, which constitutes more than one-third of the whole of the animal, presents a

the upper jaw are no visible teeth, but those of the lower jaw shut into corresponding depressions in the upper. The tongue is small, and, like the lining of the mouth, of a white colour. The upper part of the head, called the "case," contains the "spermaceti," which upon the death of the animal granulates into a yellowish substance. Beals says that a large whale not unfrequently contains a ton of spermaceti. Beneath the "case" is situated the "junk," which consists of a dense cellular mass, containing oil and spermaceti. The blubber is about fourteen inches thick on the breast, and in most other parts of the body from eight to eleven inches. By the whalers this covering is called the "blanket." With regard

to the apparently ungainly head of the Sperm Whale, Beals remarks as follows:—"One of the peculiarities of the Sperm Whale, which strikes at first sight every beholder, is the apparently disproportionate and unwieldy bulk of the head; but this peculiarity, instead of being, as might be supposed, an impediment to the freedom of the animal's motion in its native element, is, in fact, on the contrary, in some respects, very conducive to its lightness and agility, if such a term can with propriety be applied to such an enormous creature; for a great part of the bulk of the head is made up of a thin membranous case, containing, during life, a thin oil, of much less specific gravity than water, below which is again the junk, which, although heavier than the spermaceti, is still lighter than the element in which the whale moves; consequently the head, taken as a whole, is lighter specifically than any other part of the body, and will always have a tendency to rise at least so far above the surface as to elevate the nostril or 'blow-hole' sufficiently for all purposes of respiration; and more than this, a very slight effort on the part of the fish would only be necessary to raise the whole of the anterior flat surface of the nose out of the water. In case the animal should wish to increase his speed to the utmost, the narrow inferior surface, which has been before stated to bear some resemblance to the cut-water of a ship, and which would, in fact, answer the same purpose to the whale, would be the only part exposed to the pressure of the water in front, enabling him thus to pass with the greatest celerity and ease through the boundless track of his wide domain" (p. 28). When swimming at ease, the Sperm Whale keeps just below the surface of the water, and goes at about three or four miles an hour; but on an emergency it is able to attain a speed of ten or twelve miles an hour: it then progresses by means of powerful lateral strokes of its tail, and alternately rises and sinks at each stroke. In progressing in this manner, the blunt anterior surface of the head never presents itself directly to the water; the animal's body being in an oblique position, it is only the angle formed by the inferior surface which first presents itself, and this, which Beals likens to the "cutwater" of a ship, offers the least possible amount of resistance. When undisturbed, the Sperm Whale rises to the surface to breathe about once every hour. Beals says the regularity with which every action connected with its breathing is performed is remarkable; the time occupied differs slightly in each individual, but each one is minutely regular in the performance of every action connected with respiration, so that the whalers know how long it will remain beneath the surface before reappearing to renew its supply of air. A full-grown "bull," he says, remains at the surface ten or eleven minutes, during which he makes sixty or seventy expirations; after which he disappears, to return again to the surface in one hour and ten minutes. The blowing is not accompanied

by any sound, and notwithstanding the wonderful accounts of its roarings and bellowings, the Sperm Whale may be said to be an absolutely silent animal. The females and young males are gregarious, but are found in separate herds or "schools," as they are called. A "school" will sometimes consist of five or six hundred individuals. The herds of females are always accompanied by from one to three large "bulls"; but the full-grown males are said to be generally solitary in their habits, except on certain occasions, when it is supposed they are migrating from one feeding-place to another. The majority of those which occur on our coast are these solitary males; when they visit us in herds, as mentioned by Sir Thomas Browne, they are all probably females or young males. The "bulls" are very fierce and jealous, and fight fiercely. The females show great attachment to each other and to their young, so much so that, one being wounded, the others of the herd remain and fall a comparatively easy prey. The young males, on the other hand, are very wary and difficult of approach, and should one be attacked, the others immediately take the alarm and retreat. The female produces one young one, rarely two, at a time, and breeds at all seasons of the year. Their senses of sight and hearing are very acute, and after being once unsuccessfully attacked, they are very difficult and dangerous to approach.

The food of the Sperm Whale consists almost entirely of *Cephalopode Mollusks* (cuttle-fish), although at times, when feeding near the shore, it has been known to take fish as large as salmon. It is, however, essentially a deep-water species, but how it contrives to capture such active prey as fish seems difficult to conceive. Beals is, however, of opinion that the Whale sinks to a proper depth in the sea, where remaining as quiet as possible, and opening wide its mouth, the prey are attracted by the glistening white colour of its lining membrane, curiosity leading them to destruction; for no sooner have a sufficient number entered his mouth than the Whale, rapidly closing his under jaw, they are made prisoners and swallowed.

(To be continued.)

THE HISTORY OF SALAD PLANTS.

By H. G. GLASSPOOLE.

CRESSSES.

CRESS is a general name of a number of plants, mostly, if not all, belonging to the *Cruciferae*, and possessing, in common with the plants of the same order, pungent and aromatic qualities. The ancients, we are told, ate cresses with their salads to counteract the cold nature of lettuces and other herbs.

The garden cress, *Lepidium sativum*, appears to have been known to Theophrastus (see article in Rees's "Encyclopædia"), but the tribe of Nasturtium, to which the Water-cress belongs, was, no doubt,

most common in use. The Greeks thought that the warm and stimulating qualities of these plants put life and energy into persons with a sluggish temperament, and also brightened the understanding of those who partook of them: this circumstance gave rise to the Greek proverb, "Eat cress and learn more wit." Xenophon recommended the Persians to feed their children with cresses, which he said would make them grow tall, and be of more active habits. Pliny dwells much on the medicinal virtues of these plants, and recommends them to be eaten with vinegar as a remedy for those minds that were deranged. The garden cress is said to have been introduced into this country about the middle of the sixteenth century. Gerard mentions having received the seed of the curled cress, which is a variety, from his loving friend John Robins, of Paris. Thomas Cogan, in his "Haven of Health," tells us "that the often eating of this herb in salettes doth give sharpnesse and readinesse to wit." The native country of this plant was unknown until Dr. Sibthorp discovered it in Greece.

No British plant is in such popular request for salad as the Water-cress, *Nasturtium officinale*, the young leaves of which are supposed, like those of the Scurvy-grass (*Cochlearia officinalis*), to purify the blood, and therefore largely partaken of in the spring. Our old friend Gerard recommends young ladies to eat them as a restorative to the natural bloom of their faded cheeks. A decoction of its juice with that of Scurvy-grass and Seville oranges used to be given to children as a medicinal drink in the spring in days gone by. In Europe the water-cress appears to have been first cultivated at Erfurth, about the middle of the sixteenth century, but it was not until 1808 that it became an object of cultivation in England. About that period a Mr. Bradbery began to grow them for the London markets in the pretty valley called Springhead, Northfleet, Kent, with great success. In 1820 he removed to West Hyde, near Rickmansworth, where he had no less than five acres under water-cress cultivation. It is now extensively grown in the northern and eastern suburbs of the metropolis, and also at Cookham, Farringdon, and other places on the Great Western Railway, which line brings no less than a ton a week of this wholesome breakfast salad to London. Many hundred bunches are sold every morning in Covent Garden, but the largest share goes to Farringdon Market. The entire supply to the various Metropolitan markets cannot be less than from three to four tons per week (see Wynter's "Curiosities of Civilization"). The sale of this plant forms an important though humble branch of domestic commerce in our towns and cities. "Fine fresh Water-cresses!" is the first coster cry heard in a morning in the streets of London.

Water-cress contains chloride of potassium and sulphur in considerable quantities, and iodine occasionally.

The botanical name of the garden-cress, *Lepidium*, is derived from *lepis*, a scale, from the form of the seed-pouches; that of *Nasturtium*, from *nasus*, nose, *tortus*, torment, from the effects most of this genera have upon the muscles of the nose,—a name given to it by Pliny. In some counties these plants used to be called "Nose-smart" for the same reason. The word "cress," perhaps, may be derived from *creasco*, being a quick grower. In the last edition of the "English Botany" we are told that the word "cress" is found in various forms in all Teutonic languages. Some have derived it from the cross form of the flowers. Chaucer employs the Saxon form of the word *Kers*, to signify anything worthless:—

"Of paramours ne raught he not a Kers;"

from which, perhaps, is derived the phrase of not caring a *curse* for anything.

THE ANNELID "DERO."

By R. GARNER, F.L.S., &c.

THE two little fresh-water Annelids, portions of which are figured at *a*, *b*, *c*, are very distinct from their allies, the Nais, of which, however, several species are often found with them; *Nais proboscidea*, for instance. *Dero* is the generic name appropriated to the present annelids. Though hardy, they seem to require a warm temperature, and those here described inhabit the slimy mud of a pool, into which hot water is constantly pouring from an engine. A dark green *Oscillatoria* also grows in the same mud, and thrives in a higher temperature than either the annelid or the hand can endure.

The peculiarity of *Dero*, and one which makes it a pretty object for the microscopist, is the expanded membrane or respiratory disk, situated at the posterior part of the body, having projections or processes upon it, and the whole strongly ciliated, thus presenting some resemblance to the *corona* of a Bryozoon, though the ciliated processes are fewer. This part, the undoubted respiratory organ, it is the habit of the little animal to protrude out of the mud in which it lives, and when the disk is expanded, the processes fairly extended, and the cilia in strong action, few objects are more striking. There is a difference between *a* and *b* and *c*, the former having a pair of antenna-like processes, which are not retractile.

Another interesting point, and one which from the transparency of the animal and the bright-red colour of the blood, is not difficult to investigate, is the circulation. Of this, investigation has already been made,* and all that we give here is solely what we have ourselves noticed. An abdominal vein running from the head, *f*, to the respiratory disk at the opposite extremity, *a*, receives the blood from the

* M. E. Perrier, "Comptes Rendus," 1870, an extract being given in Ann. and Mag. of Nat. Hist., fourth sec., vol. 6.

head, and from what may be termed a vascular *rete mirabile* enveloping the stomach and intestine, and is divided behind, *g*, and distributed to the branchial processes. From these, vessels again converge into a dorsal artery, following the undulations of the alimentary canal, and conspicuous from an intrinsic

portions, two as above and a third behind, and the somites in the last portion have evidently been most recently formed.

A double abdominal nervous cord is plain enough all along below the longitudinal vein; the brain is less definitely seen; there are also two minute bodies



Fig. 5. Structure of *Dero*—a freshwater Annelid. *a*, *b*, *c*, posterior extremity; *d*, head; *e*, setae; *f*, *g*, vessels of the head and branchiae.

metility which the vein has not. The course of the dorsal vessel is somewhat the same as the ventral. When it lies above the middle part of the alimentary canal it forms the beautiful network already mentioned, and is, besides, connected in each somite or section of the body with large contractile loops, apparently distributing the blood to the viscera and parietes of the body, but, according to Perrier, not immediately connecting the two vessels. The little worm is well supplied with abdominal tufts of sigma-shaped hooks for crawling, and also with lateral or dorsal setae for swimming, the former are bifid at their extremes, *e*.

The mouth, *d* and *f*, is furnished with a bulbous tongue, which can be protruded a little in feeding; both here and behind the alimentary canal is ciliated; there is some appearance of a stomach at about the seventh and eighth somite of the body, and here is the liver incorporated with the canal, and also in the same region the ovaries, &c.; the intestine is dilated in each division of the body, and connected by bands with its parietes.

We have no sufficiently matured observations to offer as to the development of the ova in the *Dero*. Perrier describes its fissiparous mode of increase, but the following account differs somewhat from him. Sometimes a long *Dero*, say of fifty joints, very evidently divides into two, a respiratory disk for the anterior secondary worm, and a head for the posterior one being formed at the place of disjunction; here the anterior portion, containing the ovaries, probably becomes the germ-mother, and perhaps winter-nurse. In other cases the individual *Dero* presents three

at the sides of the brain, probably acoustic, a few darker coloured spots more forward, and apparently lateral oral ganglia. The animal is sensitive to a very slight concussion of the vessel in which it lives.

PLANT-HUNTING AT BARMOUTH.

BY J. PERCIVAL.

HAVING read with great pleasure the interesting notes of your correspondent Horace Pearce, F.L.S., of the flora of the neighbourhood of Cader Idris, I wish to add, by way of supplement, a few of the plants that came under my observation during the summer of 1876, for I find that he has omitted a great portion of the rarer species. Walking along the road in the direction of Llanaber may be seen *Parietaria officinalis*, *Echium vulgare*, *Clinopodium vulgare*, *Origanum vulgare*, *Euonymus Europaeus*, and *Asplenium lanceolatum*. This latter plant may be found for a mile on old walls and rocks, and in far greater abundance than its near ally, *Asplenium Adiantum-nigrum*. It may also be found on walls overlooking Barmouth, and also for two miles on the Dolgelly road from Barmouth; turning into the harbour, a little short of a mile from Barmouth, it may be seen there very fine and abundant. A little further, on rocks facing the sea, may be gathered *Rubia peregrina*, or the common Mad-der; growing also with it is *Inula conyza*, or the "Ploughman's Spikenard"; another mile further on brings you to *Carex extensa* and *Tamarix Gallica*; and also *Spiraea salicifolia*: both the latter have, no doubt, been planted, but probably they are as wild

there as elsewhere in Britain. Half a mile further on, until coming to a large stream, going up the hill side, may be found *Carex binervis*, *C. lævigata*, and *C. fulva*, the latter in the greatest plenty. *Gnaphalium dioicum*, *Scutellaria minor*, almost in all swampy places, along with *Drosera rotundifolia*. Up this valley, I picked up of the *Drosera* an immense number of sports, varying from one to six and seven stems from the same root; others branched into several divisions at the top of the stem: I picked up about twenty of them, and scarcely two alike. Crossing over the

it also grows on the railway banks, both near Barmouth and at Friog. Along the coast may be gathered *Crithmum maritimum*; amongst loose stones in several places, and also very fine, two feet in height, on rocks exactly behind the pay-house. In crossing the bridge, *Polygonum Raii*, *Sclerochloa loliacea* and *rigida*. On the railway banks, about 400 yards from the station, grows *Mentha rotundifolia*, and in grassy flats, running parallel with the railway at this place, there are large quantities of *Juncus acutus* and *maritimus*. On Sept. 5th, 1876, I saw hundreds of



Fig. 6. Pellitory of the Wall (*Parietaria officinalis*).

hill from this point (say a mile up the valley) in the direction of Barmouth, my friend Mr. Roger, gathered a plant of *Onobrychis sativa*. On the hill-side overlooking Barmouth may be found *Geranium sanguineum*, *Dianthus deltoides*, and *Orobanche major*; and on an old wall nearly opposite the Corsygeddol Hotel may be gathered *Orobanche Hedina*; whilst on the rocks in the direction of Llanabers near the toll-gate, may be found *Veronica hybrida*. Proceeding along the high road for a mile may be found, in the greatest abundance, *Lathyrus sylvestris*;



Fig. 7. Annual Dog's Mercury (*Mercurialis annua*).

Spiranthes autumnalis growing in the same flat with *Spergula nodosa* and a white-flowered variety of *Erythraea Centaurium*. *Erythraea latifolia* I have seen growing at Pensarn along with *Juncus acutus* and *maritimus*. *Convolvulus Soldanella* grows amongst the sand-hills near Barmouth, and in several places may be found *Mercurialis annua*, *Koniga maritima* abundant (probably an escape). *Malva sylvestris* and *rotundifolia* are both common plants. *Lavatera arborea* growing in several places on the coast; likewise may be seen *Sinapis nigra* and *Hordeum murinum*.

Crossing over the estuary, and getting on to the bog at Barmouth Junction, may be found *Phragmites communis*, varying in height from 18 inches to more than six feet. I have a specimen not 20 inches high, with roots and four perfect panicles; growing along with it is *Enanthe crocata*, *Scirpus maritimus*, and *Typha latifolia*. The last-mentioned plants grow in the sluice by the railway-side, until one gets beyond Penman Pool Station from Barmouth. At the Barmouth side of the estuary, on the bog may also be

coast to the next village, Llangrwyen, near the station, I have found *Mentha viridis*, *M. piperata*, and *M. gentilis*, and also *Tanacetum vulgare*. By the road, in woods, are large quantities of *Hypericum androsænum* and *Orobanche major*. In woods, at or near Barmouth Junction, at Arthog Falls, Torrent Walk, and several other places, I have seen *Hymenophyllum Wilsoni* in the greatest abundance. At the margin of the lakes, on the ascent to Cader Idris, from the Arthog side, I have seen *Hypericum*



Fig. 8. Tree Mallow (*Lavatera arborea*).



Fig. 9. Broom-rape (*Orobanche rapum*).

found *Radiola millegrana*, *Osmunda regalis*, *Carex distans*, *C. flava*, var. *lepidocarpa*, *Drosera rotundifolia* and *intermedia*. Going on to Arthog Station, amongst the salt marshes, may be found *Statice Limonium* and *S. variflora*, also *Sueda maritima* and *Salicornia* in the greatest abundance. *Enanthe Lachenalii* and *Apium graveolens* both grow near Penman Pool Station, and, retracing my steps to the rocks, near Friog, growing in inaccessible situations, may be seen *Asplenium marinum*; and following the

elodes. I have also seen it in swampy ground near Barmouth. I have seen *L. selaginoides* in several places near small rills near Barmouth; and *Asplenium Ruta-muraria* grows very fine on an old wall leading from Dolgelly to Penman Pool; but out of reach, except by a ladder. Amongst mosses, the rarer species I have observed are *Entosthodon Templetoni* and *E. ericetorum*, *Bartramia rigida*, *Bryum alpinum* and *B. elongatum*, *Hedwigidium imberbe*, *Zygodon viridissimus* and *Z. conideus*, *Camphylopus longipilus*

Fig. 10. Tamarisk (*Tamarix gallica*).

C. densus and *C. paradoxus*, *Rhabdoweissa jugax*, &c. *Asplenium viride* is found in ascending Cader, and

MICROSCOPY.

AN EASILY-MADE CELL.—The "American Journal of Microscopy" gives the following excellent recipe for constructing cells:—"A cell which we have found very durable, easily and quickly made, and very neat, is constructed as follows: Having procured some good gold size and pure litharge, grind the latter to a very fine powder. Mix the litharge and gold size to the thickness of cream, and colour either black or dark olive by adding lamp-black. With this paint, as it may be called, make as many cells as are wanted, and when made, dust finely-powdered litharge over them until they are covered a sixteenth of an inch deep; allow them to stand a few minutes, and then shake off all the loose litharge by means of a few smart taps. The surface of the

Fig. 11. Ladies' Tresses Orchid (*Spiranthes autumnalis*).

Lastrea amulum grows in woods near Penman Pool.—*J. Percival*.

cell will now be quite rough. Allow it to stand a few hours, and then press it against a plate of glass. If this be done carefully, a smooth, solid ring will be left on the slide. If the edges should not be as smooth as they ought to be, it is easy to trim them off on the turntable by means of a small chisel. Such cells, after a few weeks, become very hard, and may be finished so as to be very neat. For dry objects they leave nothing to be desired, and as we have had them in use for over five years, we can speak as to their durability. For objects mounted in liquids it will be necessary to coat them with suitable varnish. Thus, for saline liquids, a coating of gold size renders them perfectly impervious. For glycerine use Bell's cement, or a solution of shellac in alcohol."

THE MONTHLY MICROSCOPICAL JOURNAL.—We have received a copy of the November and December number of this well-known journal, containing a very brief account of the death of the late Editor (Dr. Lawson), and a notice that the present number is the last of the series, and that henceforth the Royal Microscopical Society intend to publish their own Transactions, after the manner of the other learned societies.

THE "SPONTANEOUS GENERATION" CONTROVERSY.—At a recent meeting of the Royal Society, Professor Tyndall referred to some hermetically-sealed flasks opened on the Alps, which, he thought, set this controversy at rest. Professor Tyndall stated that he took with him last summer to the Alps sixty hermetically-sealed flasks, containing infusions of beef, mutton, turnip, and cucumber, which had been boiled for five minutes, and hermetically sealed whilst boiling was going on. The flasks were kept for six weeks and were then opened, some in *haylofts* and others near precipices. The two groups of flasks were then placed in a kitchen, where the temperature was from 65° to 90° Fahr. The result was that twenty-one out of the twenty-three flasks opened in the hayloft were filled with organisms, whilst *all* the flasks opened near the edges of precipices remained as clear as distilled water!

SPHÆRAPHIDES.—I have found the following a very simple and efficient method for procuring spheraphides from rhubarb when not required to be viewed *in situ*:—I take a piece of rhubarb and separate the fibres into several small pieces, lengthwise, then allow them to remain for a few days until moderately dry. If rubbed together over a sheet of note-paper, the matter thus obtained may be collected on a slide: it will be found to consist principally of detached *spheraphides*. The few particles of fibre may be easily removed with a camel-hair pencil. They can then be mounted, when dry, as opaque objects or in Canada balsam, as required.—*W. H. Harris.*

BIRTH OF VINEGAR EELS.—While occupied, a few evenings since, with the microscope, examining an eel from some vinegar, I was the fortunate witness of an interesting event. I had, by the cap of the live box, caused a sufficient amount of pressure to keep the worm still, when a segment, about the centre one, ruptured and allowed the egress of a twin. The pair were, in all respects but size, precisely similar to their parent. I do not find any mention of the like occurrence in Dr. Carpenter's very excellent and interesting work, "The Microscope," very little being written about *Anguillule aceti* in the chapter devoted to *Arnulosa*.—*W. H. S.*

THE LATE DR. BEATTY.—We are sorry to notice the death of Dr. Beatty, of Baltimore, at the early

age of 40 years. Dr. Beatty was a valued contributor to our pages, and microscopists are under a debt of gratitude to him for the elaborate articles he published in these columns on "Decolouring and Staining Vegetable Tissues."

CLEANING SLIDES.—I have seen very frequently in different books, plans, troublesome and awkward, for cleaning the balsam off slides. Why do not people just wash them with rectified naphtha? The balsam is removed instantly. The hardest and oldest, when thick, only requires the naphtha to be warm; but all that can be should be scraped off first. In this way it is the easiest thing possible. I have used it for slides and lenses for many years.—*Edward Thos. Scott.*

TO CLEAN OLD SLIDES.—The following has been my plan for years, and is simple, easy, and efficacious:—Warm the slide over a spirit-lamp to remove the covering glass which, place in a water-glass with benzole. Scrape off as much as you can of the balsam, or whatever it may be, from the slide, and wash with benzole, and use an old silk pocket handkerchief, which I dip into the benzole, a very little of which is sufficient.—*John Bramhall.*

TO PRESERVE GLASS SLIPS READY FOR USE AFTER CLEANING.—As it is most inconvenient to make each slip chemically clean at the time it may be wanted for mounting a specimen, doubtless most of your readers clean a quantity (say half a gross) at a time; but then probably they have often, in common with myself, experienced the inconvenience of their again getting dirty before they are used, through their lying about in a drawer or on the table of the laboratory. To obviate this difficulty, I have recently adopted a method which is simple, and, at the same time, so effectual, that the slips may remain for months covered with dust and dirt, and yet be clean and ready for use whenever they are required. It is this:—After cleaning, the slips are arranged side by side, with their flat surfaces in approximation, when a ready-gummed piece of *silver or tissue paper*,* 10 inches long by a width which varies according to the number of slips, is affixed to their edges in the same fashion as the sheets of paper in a drawing-block are joined together, so that, although they are firmly attached to each other by their edges, their surfaces are left uncovered. The block thus bound is left to dry, when each slip may be detached by running the thumb-nail round its edges. The surface next the adjoining slip should be used for the preparation to be mounted as it is, of course, quite clean, although the other (or exposed one) may have become dirty; the fragments of tissue-paper being removed after the mount is completed.—*J. W. Groves, London.*

* Any other paper is so thick that it is difficult to separate the slips without the use of a knife.

HOW TO CLEAN THIN COVERS.—The difficulty of cleaning very thin covers without breaking them is very great. It is almost impossible to handle them in the fingers, and when they are rubbed between two plain blocks covered with chamois leather, it is difficult to clean more than one side, since one particular side will always stick to the leather next it, and the other side only will be subjected to friction. Mr. Jones has devised a very simple method of overcoming this difficulty. Into a brass cylinder he fits a heavy plug, the lower end of which is covered with chamois leather. When a thin cover is placed on a piece of stretched chamois, and the tube placed over it, the under side only of the cover is subjected to friction, and consequently a few rubs suffice to clean it thoroughly. The tube is then raised, the cover turned over by means of a delicate pair of forceps, and the other side is cleaned. The pressure of the plug is so even that there is no risk of fracture, even with the most delicate covers.

ZOOLOGY.

DUBLIN UNIVERSITY BIOLOGICAL ASSOCIATION.

—We have received three parts of the first volume of the "Proceedings" of this well-known society, containing some very valuable and well-written papers, among which are the following:—"The Leaf Structure of *Begonia*" and "Irish Fungi," by Greenwood Pim, F.L.S.; "Some Curious Marine Forms," by Prof. Macalister; and "Papers on Anatomical Irregularities," by Mr. Malet and F. O. Ross, &c.

ARCTIC BIRDS.—At a recent meeting of the Zoological Society, Mr. Henry Seebohm, F.Z.S., exhibited and made remarks upon some of the rarer Eggs and Birds which he had obtained during his recent visit to the Arctic regions of the Yen-e-sey, in Eastern Siberia, and gave a rapid sketch of his journey. Some of the skins were interesting from the fact that they extended our knowledge of geographical distribution; such as, *Phylloscopus trochilus* and *Acrocephalus schanobanus*, from long. 88° E., *Anthus Gustavi* of Swinhoe (*A. Seebohmi* of Dresser, *A. batchianensis* of Gray) from the same longitude, and young in first plumage of this species.

THE LEEDS NATURALISTS' SOCIETY.—We have received a copy of the Report of this Society, and are delighted to find it in vigorous health, and with a good programme of work before it for the forthcoming year. May we suggest to the secretaries of *Provincial Natural History*, *Microscopical*, and other societies, that they should send us the names of officers, &c., of their societies, so that our volume for 1878 may be a kind of "Science Directory," for provincial scientific societies?

ROSE-COLOURED PASTOR OR THRUSH (*Turdus roseus*).—A specimen of this rare bird was obtained

this year in the north-west of county Donegal, Ireland, where it was captured alive in the garden of the Gweedore Hotel, which is situated about four miles from the coast of the Atlantic. It unfortunately died a few hours after its capture, whilst being conveyed in a basket to the residence of Lord George Hill, the owner of the hotel. This is not the first instance of this beautiful bird being found on our shores. Thompson, in his "Birds of Ireland," informs us of one or two specimens being shot in the neighbourhood of Hillsborough, county Down, some thirty or forty years ago. Perhaps some reader of SCIENCE-GOSSIP could furnish us with other instances of its appearance, either in Ireland or England, which may have come under his notice, and which would be interesting to all lovers of birds.—*Shelah*.

SAGARTIA SPHYRODETA.—A specimen of the beautiful golden-disked variety of this anemone in one of my tanks has twice undergone spontaneous fission within about seven weeks. The original specimen had been in my possession nearly twelve months, and by care and regular feeding had increased from about the size of a fourpenny-piece, when fully expanded, to nearly that of a florin. Previously to its first division, I had noticed for several days that the base had been growing more oval in outline, and, to my surprise, on the morning of September 10th, I found it divided into two, right across the centre. The severance was not quite complete when I first discovered it, but became so in course of a couple of hours; the two portions dragging themselves away from each other, until they were about half an inch apart. The severed edges of each gradually closed together, a suture was formed, and in course of a few days I had two perfect anemones. These have thriven well, fresh tentacles have been produced, and both have increased in size, till last week I noticed that the larger of the two, which I suppose must be considered the parent anemone, was again elongating its base, as if contemplating fission. About noon of the 31st ult., I had the satisfaction of seeing that the process had begun, and watched it at intervals till completed. The base appeared to separate into two lobes, which gradually dragged a way from each other, making a rent which extended upwards, till only the mouth formed a connection between the two. This eventually gave way, and the fission was complete, the whole performance occupying about five or six hours. A few acotia were thrown out, but these were soon withdrawn, and the healing process commenced. Two days later I was feeding my stock, and offered food to the two halves, both of which seized it greedily, but soon expelled it through the partially healed rents in their columns. I shall watch the further increase of my specimens with great interest, as the species is one of the hardest and most beautiful tenants of the aquarium with which I am acquainted. It feeds well, is almost always expanded, thrives in a comparatively small

body of water, and the contrast between the brilliant yellow disk and the pure white tentacles is very pleasing. Like most other anemones, it opens best at night, and should not be exposed to too strong a light; mine are kept in a north aspect, and the colour of the disk is as brilliant as when I first had them. The same remark applies to the highly-coloured varieties of *S. troglodytes*, which are very apt to fade.—*Edward Horsnail, Dover.*

A FIVE-WINGED BUTTERFLY.—At a recent meeting of the Entomological Society Mr. Meldola exhibited a five-winged specimen of the Sulphur Butterfly (*Gonopteryx rhanni*), which had been taken in Norfolk by Mr. John Woodgate. At the same meeting Mr. H. Goss, F.L.S., showed a specimen of the Sulphur Butterfly, in which the left wings were those of a male, and the right those of a female.

DESTROYING MITES.—In reply to A. F.'s query as to destroying mites in a cabinet of Lepidoptera, I find the best and simplest method is to saturate a piece of blotting-paper in chloroform (methylated is cheapest); place it in the drawer infected, and close securely, repeating the operation two or three times, at intervals of a few hours. If the drawer be tolerably air-tight, this will effectually destroy the mites, but it should be carefully watched for some time afterwards, in case of fresh mites coming into existence from eggs, upon which the chloroform would not take effect. Camphor should be kept in the drawers of a cabinet, and renewed as fast as it evaporates—it will keep mites away; but if they are introduced with new specimens, or otherwise, they will exist in spite of the camphor. All fresh acquisitions should therefore be put in quarantine before being placed in the cabinet. Instead of camphor, a very good recipe is, equal parts of "oil of thyme, oil of anise, and spirit of wine," applied as I have described for chloroform and renewed as often as the scent goes off: it must not be allowed to touch the lining of the drawer, as it will stain the paper.—*H. Miller, Ipswich.*

THE BERLIN GORILLA.—Poor "Pongo," who returned to Berlin to die, after holding his levees at the Westminster Aquarium, has been *post-mortem* and dissected by Professor Virchow. His death was ascertained to be due to acute inflammation of the bowels,—the same disease which carries off young children so rapidly. Even in his very diseases, therefore, the Gorilla claims an affinity with man!

CHAMELEON-LIKE CHANGES IN THE FROG.—The changes of colour noticed by "J. J. M." in the frog are truly chameleon-like, and, together with similar changes seen in fish, are brought about by the same mechanism. The skin of these animals contains branched and ramified cells pervaded with fine granules of a dark-coloured pigment. Similar cells are found in certain parts of the human eye, and without the pigment in all parts of the body, in the

so-called "connective tissues." They can nowhere be better seen than in the preparation of frog's web used to show the circulation. In such an object many cells may be seen as mere black spherical patches, whilst others cover a larger surface and show the branches, joining similar ones from other cells. Now under various stimuli, applied either to the cutaneous surface or through the eye, the branched patches of pigment may be made to contract with the spherical form, whilst other stimuli have the reverse effect. Inasmuch as the cell-branches join one another, they obviously cannot contract; it is the contained pigment-bearing protoplasm that shrinks out of the branches and forms the globular mass. Obviously, when such a change occurs in the greater number of the cells present, a change in the colour of the animal must result. It has, moreover, been proved that this change can only be brought about so long as the animal's power of sight remains. Destruction of the eyes renders the pigment masses immovable. Section of certain nerves has a like effect. When any of these animals are pursued by their enemies, they are thus enabled, by rendering themselves pale and therefore less easily seen, to elude their would-be captors. Emotions other than fear may also, perhaps, be expressed by this means, and not only can some creatures render themselves pale, but actually approximate their colour to that of their surroundings. Such is the permanent state of very many animals; this condition being brought about by natural selection, e.g. lions, sand-colour; muddy water fish, mud-colour; green, sloths, &c. &c. Pallor, as an expression of human terror, brought about by a contraction of small blood-vessels, may have had a similar cause, it at least seems analogous.—*D. A. K.*

HOLES IN THE HEAD OF PIKE.—The apertures on the head of the common pike (*Esox lucius*) are the openings of follicles, or mucus-secreting glands. Similar but smaller openings may be found along the lateral line that separates the dorsal from the ventral half of any fish. These openings form an uninterrupted series, from head to tail, and constitute the opening of muciparous ducts that may be seen as white threads by the naked eye on dissection. The function of these glands is obvious; they secrete the mucus by which the integument of the animal is lubricated, and probably act also as sweat-glands to excrete waste products from the system.—*R.*

NEW HABIT OF RED GROUSE.—It does not matter whether Mr. Dixon or Mr. Dealey claim the honour of calling the attention of naturalists to the habit of Red Grouse perching on trees. It is a habit that all persons who reside near the moors (who take any notice of the habits of birds) are familiar with. I saw them perching on trees and hedges years before the time they say they first observed them.—*James Ingleby.*

BOTANY.

ASPLENIUM SEPTENTRIONALE AT DOLGELLY.—

It has been known for some years amongst a few lovers of nature that not only *Asplenium septentrionale* but also *A. germanicum*, Weiss, grew in the Dolgelly district, and it has only been from a desire to preserve the plants from extirpation that the habitat has not been made public. Now that it is known, it may be well to place the discoverers' names on record. *Asplenium septentrionale* was discovered in 1867 growing on an old wall not far from the river Mawdach, by Mrs. Chamberlain Barlow, of Edgbaston. The plants of it (two only I think) were of course spared, and for some months I saw them every time I passed the locality, peering stealthily at them, for fear they should be discovered by some ruthless collector, and believing at that time they were the only plants in the country. After a considerable interval, when I revisited the spot, the wall had been altered or repaired, and the little ferns had disappeared. Some time afterwards the Rev. W. Foley Vernon, of Shrawley, searched the crags on a hill that rose up behind the old wall, and had the pleasure of finding both *A. septentrionale* and *A. germanicum* in tolerable abundance, and I have a fine-grown plant of each which I owe to his kindness. I enclose a few fronds. May I ask your botanical contributors if they know of any locality where one only of these two species is indigenous without the other occurring somewhere in the immediate neighbourhood? An acute observer has informed me that they are always found together, and suspects a more intimate relationship than is generally supposed to exist between them.—*T. Belt*.

GENTIANA ACAULIS (L).—Without in the least wishing to impeach the veracity of Mr. Colebrook, especially as he is "as certain as he is of his own existence," that this plant was growing upon Cader Idris in August, 1862, I would inform him firstly that, so far as my experience goes, the *G. acaulis* of the Swiss Alps is in its full bloom towards the middle of June, and completely and entirely over by July, ripening its seed in that month. Its place is then taken by *G. bavarica*, and others of that section, as well as *G. campestris*, *Germanica*, and *Amarella*, which are essentially August flowerers. With regard to the remarks, "the present plant has no stalk, whence its name *acaulis*, but cultivated in gardens it becomes [*sic*] one,"—does Mr. Colebrook here intend to make a playful allusion to its peregrinary powers, as well as origin, the word *stalk* being a double-entendre in the sense of a *stalker*. I believe *G. acaulis* was found at Staffa in the month of June, 1834-5; but doubtless it had escaped from cultivation, as the plant has never been seen there since that time. Concerning the subject of Mr. Colebrook's other query—*Coloneaster*—I obtained it in the month

of June, 1874, from the one situation on the Great Ormeshead, where it is still to be found; and I must say that had I not been guided to the spot by one who knew it well, I might be still searching, but in vain, for it. Associated with it, in the clefts of the limestone rock, was abundance of the local *Potentilla verna*.—*J. C. M.*

GENTIANA ACAULIS.—I have been interested in reading the remarks on this plant that have appeared lately in the pages of SCIENCE-GOSSIP. Many years ago I came across what I had no doubt was *Gentiana acaulis*, growing in tolerable profusion, and, as might be supposed, truly wild on the downs between the Needles and Freshwater, in the Isle of Wight. It was a small plant, without stalk, about 1½ inch high, half of which comprised the large bright blue flower. At that time I was not aware that *Gentiana acaulis* was "not a native," so I made sure of my prize, and gathered as much of it as the strong wind blowing at the time would suffer me to do. On subsequent examination and reference to Sowerby's "English Botany" and other authorities, I came to the conclusion, and I believe rightly, that it was the veritable *Gentiana acaulis*. A little further down the slopes of the hill, upon the same occasion, I came upon *Gentiana Amarella*, so I had an immediate opportunity of comparing the two flowers and observing the wide difference between them. Some time after this I became aware that the lovely little *Gentiana acaulis* had been excluded by botanists from its former place in the British Flora, and I have often wondered since how it came to pass that its beautiful blue flowers had found that accidental lodging far away from houses and gardens, up on the wind-blown heights of the Freshwater Downs. I have never visited the spot since, and I should be glad to know whether any of the readers of SCIENCE-GOSSIP have, like myself, ever met with it in their wanderings in that locality.—*Isabella H. Knox*.

PLANT CHEMISTRY.—Professor Church has examined the colouring matter of the well-known bordering plant with variegated leaves, *Coleus Verschaffeltii*, and thinks that it is identical with *anobin*, the colouring matter of red wines, as well as with other substances extracted from blue and purple flowers.

SOLANUM DULCAMARA.—Can any of your readers give me any information as to the properties of the berries of this plant? "Chambers's Encyclopædia" says, "red berries of tempting appearance, which, being poisonous, are not unfrequently the cause of serious accidents, particularly to children." Garrod, in his "Materia Medica," says he has administered half a pound of the ripe fruit as a conserve, and without any definite effect. Buffon says "the scarlet berries are not poisonous, five pounds weight given in the course of ten days did not produce poisonous

effects"; but neither of these authors says if the berries were swallowed by man or beast. I think I should have a difficulty in finding any one who would eat even two or three berries, as they are almost universally considered poisonous.—*Dr. Morton, New Brompton, Kent.*

HYBRID PRIMULA.—The frequent tendency of the Primrose family to hybridize often causes a difficulty in determining a plant and its varieties. The *Primula elatior* is by some supposed to be a hybrid between the *P. veris* and the common primrose; and Sir William Hooker "was not satisfied that the *Primula elatior* of Jocquin was really distinct from the numerous hybrids between *P. vulgaris* and *P. veris*." In one locality near Geneva I found both growing together in abundance, producing different forms of hybrids, some approaching one parent plant and some the other. Many Swiss botanists call the *P. vulgaris acaulis*, as it appears to be stemless, with a variety β , which, as having an evident, though very short, stem or scape, they place the Primulas in two divisions, as "espèces légitimes capsule fertile," and "espèces hybrides capsule avortée": under the former they include *P. veris*, *P. vulgaris*, and *P. elatior*; under the latter, *Primula acauli-officinalis*, *P. acauli-clatior*, and *P. clatiori-officinalis*.—*T. B. W.*

ANOMALOUS PARTS OF PLANTS.—I gathered some *Trifolium repens* this last summer at Esholt, near Bradford, the calyx segments of which were transformed into leaflets; in some of the heads all gradations betwixt leaflets and calyx segments could be observed. I afterwards gathered some in Chee Dale (Derbyshire), in which all the calyx segments were converted into leaflets, some of the latter being on petioles several times the length of themselves. Two friends of mine have noticed this also, but I have not seen it recorded. I gathered some specimens of *Claytonia perfoliata* at Bakewell, in all of which the leaves that are usually perfoliate were not so at all. The several text-books I have been able to consult (including Symes) do not give any habitat for this plant: the specimens I gathered were growing amidst *Chrysosplenium oppositifolium* in the middle of a wood, which appeared a very unlikely place for its introduction as a weed of cultivation. I collected also in the same wood a *Myosotis*, having the corolla nine-partite. Near Bradford I gathered *Silene inflata* with two complete flowers (except the calyx) in one calyx; also in this neighbourhood, *Lolium perenne*, in which the spikelets were transformed into spikes. Near Leeds I collected *Juncus bufonius* in a viviparous state, like that which *Juncus supinus* often assumes; but I have not seen this state recorded. I gathered a specimen of *Lychnis diurna* near Miller's Dale, in which the stamens were transformed into petals. At Eldwick, near Bradford, I got a specimen of *Orchis maculata*, which agreed with the description of that plant in every particular

save the lip, which was about twice as long as usual and strap-shaped, with parallel sides, tridentate, the central lobe being less than the others. I have received from Scotland a specimen of the common Dandelion, the peduncle of which is furcated, bearing two capitula.—*Wm. West, Bradford.*

INFLORESCENCE OF GOURDS AND PUMPKINS.—In SCIENCE-GOSSIP for November was an interesting note on the above topic by John Gibbs. He notices that the fruit on fertile blossoms appear first—before the sterile blossoms on the same plant. In this country (Michigan, U.S.A.) I have often noticed many staminate or sterile flowers open before a single pistillate flower had opened. This I have repeatedly seen in case of Hubbard squashes, summer squashes, and several varieties of cucumbers. I do not make this assertion as doubting what Mr. Gibbs has said, but as a curious difference. If he is correct, perhaps our warmer and drier summers may have something to do with it.—*W. J. Beal.*

GOURDS AND PUMPKINS.—The fact to which Mr. Gibbs calls attention is one of considerable interest. The separation of the sexes is common enough in flowering plants, and in the Gourd tribe is of two degrees: on distinct flowers (monoecism), or on distinct plants (dioecism). It has also been noticed in these delicious flowers, as well as in those structurally "hermaphrodite" or "monoclinous," that the sexes are sometimes developed simultaneously (synamic), sometimes successively (dichogamous); but of the two possible cases of the latter—at least in "monoclinous" flowers—the precedence of the male (protandry) is far more frequent than examples similar to the one Mr. Gibbs describes (protogyny). This might be expected in single flowers, since the stamens occupy an older whorl than the carpels; at least, are generally believed so to do. But when we come to diclinous plants, new interests arise. A most careful and assiduous American observer, Mr. Thomas Meehan, of Philadelphia, has shown that there is a close relation between sex and energy, and that female flowers are more characteristic of strong shoots than male. Might we not, therefore, expect a plant to produce male flowers only after its energy has been to a certain extent exhausted in producing female ones? Numerous cases are on record, especially of figs and oranges, of the swelling of the "fruit" without the fertilization of the ovule: it would be interesting to learn if this ever is so with gourds. Of course, however the "fruit-blossoms" may "make haste," they cannot set seed without pollination. In this case, the pollen must be derived from another plant probably, perhaps from another situation where different conditions make gourds flower earlier; so we may have here an illustration of Mr. Darwin's rules that, while pollen from another flower of the same plant is little, if at all, better than that of the same flower, pollen from another plant is an advantage, and if

from one grown under different conditions, even still more so. I hope Mr. Gibbs will continue his observations. He could not have a more interesting or practical subject.—*G. S. Boulger.*

FERTILIZATION OF FLOWERS.—Dr. Müller has called attention to the occurrence, in some of the *Labiatae*, of two distinct forms, one with larger hermaphrodite protandrous flowers, and the other with smaller female flowers. He shows that the latter can only be fertilized by the former, and that they disappear when the former are not present. We would suggest that our botanical readers should devote their attention during the coming summer to the analytical structures of well-known and abundantly-represented orders of plants; and, further, that they should also note the kind of insects which frequent them, and whether these insects affect any special colours of flowers.

GEOLOGY.

PREHISTORIC MAN IN JAPAN.—Mr. E. S. Morse sends a note to *Nature*, in which he gives an account of the Kitchen Middens at Omori, in Japan, which contained arrow-heads, bone implements, but no flint or stone weapons. Mr. Morse believes these large shell mounds were accumulated by a prehistoric race of men in Japan.

THE INSECT FAUNA OF THE PALÆOZOIC PERIOD.—Mr. Herbert Goss, F.L.S., has read a paper on the above subject before the Brighton and Sussex Natural History Society. This makes the third of Mr. Goss's papers on fossil insects, and it is equal in character to its predecessors. In these three papers the geological student is possessed of a most valuable generalization of all that is known on fossil entomology.

JOINTED LIMBS IN TRILOBITES.—Mr. C. D. Walcott has just figured and described jointed limbs in the genera *Calymene* and *Ceraurus*, from the Trenton limestone. *Calymene senaria* showed axial appendages with three joints. In *Ceraurus pleurexanthemus* the limb was five-jointed. The legs ended in a single blunt end, and Mr. Walcott thinks these trilobites will be found to have five or six joints with a terminal claw. He further thinks that the discovery of these limbs more closely than ever associates the Trilobites with the King-crabs and Eurypterids.

THE CUMBERLAND ASSOCIATION OF LITERATURE AND SCIENCE.—A copy of the Transactions of this vigorous natural history and literary society has been sent us, and it is a pleasure to find so high a degree of culture so far removed from the centres where culture is supposed to be especially confined. But the development of local science is nearly always dependent upon the personal interest taken in it by a

few men, and there can be little doubt that the great success of the Cumberland Association during the last two or three years is mainly due to their possessing such an indefatigable secretary as Mr. J. Clifton Ward, F.G.S., of her Majesty's Geological Survey, the author of a number of remarkably suggestive papers on Geology and Physical Geography.

ARTIFICIAL PRECIOUS STONES.—MM. Frey and Freil have recently been experimenting on artificial productions of corundum, ruby, and other crystallized silicates. They showed that in a crucible of refractory earth they put a mixture of equal weights of *alumina* and *minium*; and calcined them for some time at a red heat. After cooling, they found two layers, one vitreous (formed chiefly of silicate of lead) and the other crystalline, and often presenting geodes full of beautiful crystals of alumina. To obtain the red colour of ruby, about two or three per cent. of bichromate of potash was added to the mixture of alumina and minium. A silicate of alumina was produced by heating for some time a mixture of equal weights of silicon and fluoride of alumina.

PRECAMBRIAN (DIMETIAN AND PEBIDIAN) ROCKS IN CAERNARVONSHIRE.—At a recent meeting of the Geological Society, a paper on this subject was read by Dr. Hicks, F.G.S. The author gave an account of the special examination of the great ribs of so-called intrusive felspathic and quartz porphyries which are found associated with the Cambrian rocks in Caernarvonshire, made by him in company with Professor Hughes, Mr. Hudleston, and Mr. Homfray last summer. He described sections at and near Moel Tryfan and across the mass from Pen-y-groes to Talysarn, in which he showed that instead of being of an intrusive nature, as hitherto supposed, the whole, with the exception of a few dykes at those parts, is made up of bedded volcanic rocks, lavas, breccias, &c., similar to those found in the Pedibian series at St. David's, and that the Cambrian rocks, instead of being intruded by this mass, rest everywhere upon it unconformably, and the pebbles in the conglomerate of the Cambrian at the base are, as at St. David's, identical with, and must have been derived from, the rocks below. Similar results were obtained in the examination to the north and south of Llyn Padarn, and the conclusion, therefore, at which the author has arrived with regard to the great mass which extends from Llanellyfine in the south to St. Ann's chapel in the north, is that it is entirely Precambrian, and that it belongs to the series described by him under the name Pebidian at St. David's. The other mass, extending from Caernarvon to Bangor, he considered also entirely Precambrian; and from the mineral characters exhibited by a portion of this mass directly behind Caernarvon, he thought it would prove to be, at least at this part, of Dimetian age. The altered beds near Bangor and their associated quartz felsites he

considered entirely of Pebidian age, as there is no evidence that the Dimetian rocks are exposed there. Afterwards, Professor Hughes read a paper on the Precambrian rocks of Bangor, which consist of slates, agglomerates, and porphyritic rocks; and these, he thinks, are equivalent to Dr. Hicks's "Pebidian."

PALMAM QUI MERUIT.—The Royal Society of England have just awarded Professor James D. Dana, the distinguished American mineralogist and geologist, their highest honour, the "Copley Medal." The "Royal Medal" went to Professor Heer, the equally distinguished fossil botanist, of Zurich.

A FOSSIL FUNGUS.—A very interesting article in your last number, which is headed "A Fossil Fungus," refers to the discovery of a fossil fungus in *Lepidodendron*, by Mr. Carruthers, and its subsequent study and classification by Mr. Worthington Smith. It is there stated: "This is, perhaps, the oldest fungus on record." As this is not quite correct, I beg to inform you that in 1858, C. Wedd found something very much like *Saprolegnia ferax* in a *Leptæna* from the Devonian. In May, 1876, I read a paper before the Geological Society, in which unicellular algæ were described parasitic within a foraminifer from the Lower Silurian, a coral from the Upper Silurian, in brachiopods, and corals from the Devonian, and from a coral in the Miocene. I named and figured this penetrator *Palæachlya perforans*. In the Proceedings of the Royal Society, No. 174, 1876; I explained the physiology and morphology of *Achlya penetrans*, now found in recent corals and shells, and explained the life cycle of this *saprolegnious* plant, so that, from its almost complete resemblance with the ancient form, it could be considered its descendant. The septa, which are said not to occur in the mycelium of *Saprolegnia* are really seen very rarely, but still they do exist.—*P. Martin Duncan.*

ERRATUM.—In my last paper on the Carboniferous Polyzoa, December 1877, the reader will oblige by correcting the following: page 272, 8th line in list, *G. flexicannala* read *G. flexicarinata*. Page 273, 1st col., 11th line from top, for "genus" read "family."—*G. R. V.*

NOTES AND QUERIES.

THE PAIRING OF BIRDS.—Is it sufficient proof of birds pairing for life, that we find the old nests tenanted year by year? Some birds are known to use the old nests of other species; e.g., the House Sparrow, which is one of the species which, upon this evidence, Mr. Dixon quotes as pairing for life, frequently uses the old nests of the House Martin; and if of other species, why not of the same species? I fail to see why Mr. Dixon supposes that polygamy tends to prolificness: it can only do so if the number of females born, or arriving at maturity, be in excess of the males. Among mankind, as men and women

arrive at adult age in about equal numbers, if one man have two wives, another must go without one, and it is obvious that both the procreative power, and what is probably of more importance, the power to maintain offspring of two males, will be greater than that of one male. Polygamy can only tend to a more rapid increase of population where the number of females is much in excess of that of males, either through female immigration, as in the Mormon settlements, or, as more usually happens, through the greater mortality of males. It is hard to believe that nature has been so considerate to mankind as to make fowls polygamous in order that the superfluous males may afford us food. It seems more reasonable to suppose that the habit of polygamy is in some way advantageous to the polygamous species itself. Polygamous animals are usually provided with special weapons of offence, like the cock's spur, and are in the habit of fighting for the females: the strongest and best-armed male wins the largest number of fair prizes, and the progeny of such a male are likely to have the advantage over their competitors in the struggle for existence. It does not seem difficult to explain why species which are monogamous in the wild state should be polygamous in captivity. Given an excess of females over males, and in the absence of social and moral restraints, polygamy follows as a matter of course.—*H. F. Parsons, M.D.*

PAIRING INSTINCTS OF BIRDS.—If birds returning to their old nests is a sign that they pair for life, I may add to Mr. Dixon's list the Blackbird (*Turdus merula*), for a nest has been occupied successively for the last three years by a pair of these birds. Now as there are two or three other nests in the same hedge, I think it must be the same pair that has successfully reared three broods in the one nest. Perhaps Mr. Dixon—since he has been observing particularly the pairing instincts of birds—could kindly give me some information as to one species of bird pairing with another (see SCIENCE-GOSSIP, p. 263). I have known instances of hybrid grouse, but never of a hybrid between a blackbird and a thrush.—*G. F. B.*

MITES IN A COLLECTION OF LEPIDOPTERA.—In reply to the query in the December number of SCIENCE-GOSSIP I beg to say that, having had the misfortune to find mites in my collection of Lepidoptera, I was recommended to try naphthaline, and so far as I am at present able to perceive, no further destruction has taken place since I used the same. I put the naphthaline in a small pill-box with a perforated lid, which is glued into the corner of the drawer, and does not attract attention. Any insect specially affected should be removed from the cabinet or store-box and carefully painted on the thorax with corrosive sublimate.—*A. J. R.*

DESTROYING MITES ON LEPIDOPTERA.—In answer to "A. F.'s" query on this point, let me draw his attention to the following extract from Mr. Newman's preface to his splendid work on British Butterflies and Moths:—"Directly you observe any dust, however little, underneath an insect, . . . take out the infected individual; as soon as he is removed from the drawer, drop benzole on his back, drop after drop, until he is thoroughly saturated, and all his wings are rendered perfectly transparent. In this state remove him to the drying-cage, and there let him remain until all the benzole has evaporated, and his colours have returned, bright and beautiful as ever." I have not tried this method myself, but I have friends who have, and they find it to answer perfectly.—*W. J. B.*

THE "FURNITURE" BEETLE.—Having just been put to much expense by repairs to furniture and skirting-boards, &c., which have been injured more or less by the furniture beetle, I should be glad to elicit any remarks upon its probable cure or prevention. I have generally found it in the sappy part of the wood, and have found it in every kind of wood used in house-building and furniture, except in mahogany; and I cannot hear of its being ever found in pitch pine. I am not sure of the correctness of my supposition, but I think that the beetle (it is not larger than a middle-sized pin's head) bores and lays its eggs or eggs, and the grub eats till its changing period, the beetle from which then eats its way out; the holes not being larger in bore than a middle-sized pin. I have just been taking out several pieces of wood in my house, but could not detect the insect itself in any stage of existence. I have only twice seen the beetle, and can recollect the time was summer or autumn. On my own premises I have also found it out of doors, in old wood laid aside two or three years for burning. I hope to have some remedy discovered that may protect the new wood now replacing my damaged furniture and shelves.—*J. Hughes.*

MISTLETOE.—In reading the short notes on this species in the December SCIENCE-GOSSIP, I remembered seeing many large specimens some few years ago when engaged as a botanical collector in Normandy, that would with ease have been sufficiently long in the stem to have made a "small javelin." At the time, I took particular notice, but I do not believe I saw a single example on the Oak; the finest specimens were observed on the Lombardy Poplar. It is very abundant in the north of France.—*R.*

MISTLETOE ON LIME-TREES.—I do not think that this is an unusual phenomenon. Next to the Apple, the Hawthorn, and the Black Poplar, I should say that the Lime was the most frequent host of the Mistletoe. I have never seen the mistletoe growing in greater luxuriance than on two fine avenues of limes at Cutteridge House, near Westbury, Wilts. Near Malvern, where the mistletoe is abundant, I have seen it growing on a variety of other trees, as the Oak, the Maple, the Willow, and *Robinia Pseudacacia*.—*H. F. Parsons.*

SEEDS OF MISTLETOE.—Some twenty-two years ago I put two seeds of Mistletoe in a cavity formed on the stem of a young apple-tree, caused by the partial healing over of the part where a small branch had been cut off the previous season, tying a string of bass over to prevent birds, &c. from picking out and devouring them. They both took, and in three years had grown to about three inches in length; since then they have grown to about two and half feet through, but during the time have only produced three berries: that was two years ago. Since then one of the plants has died. It first showed symptoms of decay by the leaves becoming yellow and dropping off; since then it has fallen away piecemeal by breakage at the joints, the larger portions still remaining attached. The other plant, although so close, remains in perfect health and looks as usual, except that it is much thinner from the loss of the intermixed branches of the former plant. I cannot say which of the plants is dead,—either that which bore the berries or otherwise, but the remaining plant has no berries this season. Until the berries were produced, I had a notion that the plants were of one sex, consequently barren, but had always neglected examining them to ascertain the fact, which I now regret, as I fancy the berries produced were barren;—at

least, none of them grew when inserted in the usual way. My plants, at first, were of very slow growth: the first season only produced two small stumpy leaves from each seed; the second, four on each, and so on; and I rather think only one joint in length has been produced of a season, but as the plant got stronger, frequently four shoots were produced instead of two, increasing thereby much faster, as well as forming a handsomer and much stronger-looking plant. Some years ago, I was much pleased and interested by observing, about an inch above the plant, several young plants which had pushed their way through the bark, which they have since continued to do, always ascending, and about an inch from each other, some of which are now dead and some living; from which I draw the conclusion that those produced from the former plant are dead also. These off-sets were of equally slow growth as the young seedlings, only a pair of leaves of a season, although more elongate, and I cannot understand H. E. Wilkinson's statement when he says he observed a protuberance and very soon a leaf,—mine always came in twos—and presently a good-sized plant of Mistletoe. Mine always take four or five years to come to anything like a good-sized plant, and I have grown many since the first, both on apple and pear-trees. The "Dumelow Seedling" is the apple on which my large plant is now. It was removed once when the Mistletoe was about five years old: it made not the slightest difference to its growth; but I have lost plants by removing the tree when only of the first year's growth. I also lost a fine young plant of four years' growth by the dying off of the tree itself by canker of the root, the Mistletoe living some months after the tree died, but losing colour and becoming rigid, and finally perishing also. My trees do not suffer in the least from the growth of the parasite on it, either in growth or bearing, although established on the main stem about three feet from the ground.—*Wm. Curnow.*

HOW TO PRESERVE ANIMALCULÆ.—I have several works on the microscope, but I have never read of any way to preserve animalculæ; that is, the best medium to use. I have tried several, but none have acted satisfactorily; viz., spirits, glycerine, glycerine and camphor: the last was the best. I mounted some *Canthocamptus minutus* and some *Chydorus sphericus* in it, and found the objects looked better than when preserved in the other mediums, but still they were not to my satisfaction. Could you, or some of your correspondents, tell me of some better medium, I should be greatly obliged.—*H. Foley-street, Portland-place.*

ROOT-PROPAGATION OF THE IPECACUANHA.—In a paper on root-propagation read by Mr. Lindsay, of the Edinburgh Botanic Garden, before the Scottish Horticultural Association, that gentleman stated a curious fact in connection with the propagation of the Ipecacuanha by that operation—viz., from a piece of the root about a foot long or only one of the rings of the annulated root, one plant would be the consequence. Have any of the readers of SCIENCE-GOSSIP had any experience of the multiplication of that highly serviceable plant in that way?—*M. King.*

BADLY-BLOWN EGGS.—If any of the able correspondents to your journal could tell me of some fluid that would dissolve the hard albumen in badly-blown eggs without affecting the shell, I should be much obliged. I have had some rare eggs given to me that I wish to preserve, many of which are so badly blown that they have broken with very careful handling.—*G. T. B.*

PRESERVING ANIMALS.—I have just seen an article mentioning a method of preparing insects, fish, &c., for the cabinet, said to have been practised many years by Mr. Waterton, of Walton Hall. It is stated that the specimens are perfectly life-like, and not liable to damage by moth, mite, mould, or grease. I should be much obliged to any reader of SCIENCE-GOSSIP who would give me a few details of the process, or refer me to some work containing the necessary information.—*W. G.*

STORMY PETREL.—Dr. Keegan, in his article in the September number of SCIENCE-GOSSIP, states that this bird is only found in the wake of vessels during stormy weather. He then goes on to give a very ingenious theory to account for this, or rather to account for their following ships at all. In the North and South Atlantic, where the trade winds prevail and storms seldom or never occur, Mother Cary's chickens are constantly seen, and frequently near the equator, where possibly there is not a ripple on the water at the time. I think it is hardly necessary, when accounting for these or other birds following vessels, to bring forward a theory of their supposed love of the beautiful. The fact is, they know by experience that substances—to them very great delicacies—are continually thrown overboard, and they will as readily follow a hideous collier as a magnificent full-rigged ship. On the Thames, the Herring Gulls have the good sense to prefer fishing-boats, however old and dirty, to the smartest yacht on the river, well aware that from the former they will obtain the larger amount of food.—*J. S. G.*

THE VETERAN EEL.—I think that this subject will be one of interest, not only to "E. L.," but also to many aquarium-keepers, particularly so when we read of the death of an eel at the age of twenty-two years. I for one should be glad to know from Mr. Plant its size when he first had it, and at its death. Two years ago I had an eel which has grown three quarters of an inch in my keeping, and is now nearly four inches long. If this be the proportional rate of growth, we shall easily see to what length it will have attained in twenty-two years. I find that the best material to feed eels upon is the common blood-worm, which ought to be well washed before being put into the aquarium; otherwise some of the mud in which they live will be thrown into the tank.—*J. J. Newton.*

CEMENT FOR MARINE AQUARIA.—I can fully endorse the opinion of Mr. Worster as to the value of pitch as an aquarium cement, especially when used in the manner which I shall presently describe. A year and a half ago I rendered perfectly water-tight an eight-gallon tank which had been for years thrown aside as useless, and it has not leaked a drop since. This last spring I built another, holding about eighteen gallons, with an inch slate bottom, to which are screwed through holes drilled in the slate, the two ends of Spanish mahogany, well clamped to prevent warping, and lined with stout roofing slates cut to exact size. Into the mahogany ends the front and back of plate glass are grooved, and the whole finished with a strong mahogany capping rail all round, which also serves the purpose of tying the two ends well together. The glass is of course set in red-lead putty, and after giving the latter time to harden, I coated all the joints, the inner faces of two wooden rails into which the bottom of the plate glass was set, and in fact, every part which was likely to leak, with a mixture of pitch and gutta-percha (about quarter part of the latter). This mixture was laid on pretty thick with a putty-knife when just hot enough to stick. I then cut strips of sheet glass of

suitable widths, and from two to four inches long, heated them over a small gas stove, and pressed them while hot into the pitch: of course, a pair of hot pliers must be used to handle the glass with, or it will fly. This plan I have found to answer admirably; it prevents the pitch from chipping or flaking off, and the best of it is, a tank so treated is ready for use immediately, as there is no effluvia of red-lead to be got rid of, every particle of poisonous cement being covered up with pitch and glass. This tank has now been stocked about four months, and is in every respect satisfactory. I may mention that one or two of my friends and myself have long been in the habit of using for rock-work a calcareous tufa found in this neighbourhood. It can be obtained in good-sized pieces, forms a good nidus for conferva, and is easily worked out into caves and hollows suitable for aquarium animals to shelter in, whilst at same time hard enough for the purpose. It also has the advantage from its porous nature, of holding a good deal of water, so that the space it occupies is not all lost.—*Edward Horsnail, Dover.*

AQUARIUMS.—Why should sticklebacks fight so in aquariums, as "S" says, unless they cannot get food properly; for they live in shoals: at least, we find numbers together, though at times they seem very jealous of one another, and do not like intruders into their peculiar domain?—*Edward Thomas Scott.*

SLUGS AND FOXGLOVES.—With reference to Mr. J. W. Slater's observations respecting slugs and snails feasting heartily on the leaves of the Foxglove, I can testify to my fowls doing the same thing with impunity—without any bad result to those who subsequently eat their eggs.—*G. F. Cooke.*

UNUSUAL APPEARANCE OF THE MARTIN.—This week (December 4) this bird is busily flying about the summit of Overton Hill, Cheshire: it selects a sheltered wooden shed every evening for its roosting-place. It must have been a late-hatched bird, and thus left behind when its friends migrated. My little boy, who takes a deep interest in ornithology, states he believes it has been injured, and, therefore, not able to undertake the wearisome journey to a warmer climate. Mr. G. White would probably have made much of this fact in his day.—*R.*

WHITE HAIRBELLS.—On October 31st, I gathered several beautiful albino specimens of the common hairbell (*Campanula rotundifolia*), by the side of the Upper Shaftesbury road, about a mile and a half from this town. I gathered several on the same spot in October last year. It is noticeable that although not the slightest trace of colour was discernible in the flowers, yet, upon being dried, they assumed a bluish tinge. The ordinary pigment was therefore not quite absent, but was only precipitated in the process of pressing. Is not *hairbell*, as above, the correct name for this graceful little flower, on account of its fine hair-like stem, and not *harebell*, which is quite unmeaning?—*W. R. Tate, Blandford.*

BOURNEMOUTH INSECTS.—With reference to Mr. Groser's remarks (p. 256, November number) upon the larvæ of *E. jacobææ*, I may mention that I have seen them here regularly year after year on the Ragwort, but have often observed that they occur in patches; i.e. one patch of ragwort will swarm with them, while the next will have none. I infer that this is due to the sluggish flight of the insect. Bournemouth possesses an excellent list of local lepidoptera: I may instance, *N. viridata*, *E. cribrum*, *H. dipsacens*, *B. trifolii*, *L. littoralis*, and others.—*E. B. Kemp-Welch.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP at least a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

SCIENCE GOSSIP BOTANICAL EXCHANGE CLUB.—In our last number we prematurely stated that all the parcels had been made up and sent out in connection with the above club. The majority of them have been delivered, but there still remain others, which will be forwarded as soon as possible. The work of arrangement and exchange has been enormous, and we must beg those members who have not yet received parcels to entertain a little patience. We feel certain that the result will satisfy all parties.

J. BRAMHALL.—It is not at all meditated to bring out a second edition of Blackwall's "Spiders" at present. We are not aware whether Messrs. Douglas & Scott have yet published their monograph on British *Homoptera*.

S. T.—Get the "Collector's Handy Book," price 2s. 6d., published by Hardwicke & Bogue, 192, Piccadilly. You will there find full instructions as to mounting microscopic objects. The best way of preserving animal bones is to steep them in gelatine, or boil them in a solution of glue.

F. H. L.—The "coral-like substance" you sent us from Falmouth beach is not a coral but a lime-secreting sea-weed, called by Harvey *Melobesia fasciculata*. It is allied to the common *Corallina officinalis*.

E. EDWARDS.—Many thanks for your good wishes. You had best procure Robson's book of "Botanical Labels" from Messrs. Hardwicke & Bogue, and paste each label on the species.

W. K. (Leeds).—We know of no better way of hermetically sealing specimens in bottles containing spirits than the old-fashioned one of covering the outside of the cork with a layer of melted sealing-wax.

K. A. DEAKIN.—The Palaeontographical Society have published the fossils of nearly every British formation, and these are contained in about thirty large volumes. By applying to the secretary, Rev. T. Wiltshire, Lewisham, we have no doubt you could obtain a list of all the society's publications. You can get the implements you speak of at any large natural-history dealer's.

J. H. MORTON.—There is no possible danger of being bitten by the slowworm (*Anguis fragilis*).

S. T.—For stocking small aquaria see instructions contained in "The Aquarium, its Structure and Management," published by Hardwicke & Bogue, 192, Piccadilly.

J. D. O.—Get S. Wood's shilling book on "The British Bird Preserver," published by Warne & Co.

A. MICHAEL.—Your desmid is *Closterium setaceum* (in conjugation).

J. R. JAMES.—Many thanks for your kindly suggestions, they will not be unheeded.

EXCHANGES.

DR. MORTON, New Brompton, Kent, would like to have a botanical correspondent in Southampton or neighbourhood.

FOR well-mounted slides or good material the following objects, unmounted:—Barbados *Polycystina*, sponge sand, infusorial earth, cleaned guano, leaves of *Deutzia scabra* mounted and unmounted; mounted slides of *Polycystina*, *Foraminifera*, flies' tongues (good), diatoms from Yarra Yarra, New Nottingham, Mediterranean, &c., *Arachnoidiscus*, *Isthmia*, Salicine, double sulphate magnesia and copper, selenite films, eel's skin, parasites various, polyzoa, and others.—William J. Fuller, Broad Plain Soap-works, Bristol.

HERBERT WHELDON, South Parade, Northallerton, Yorks, will send post-free fifty foreign stamps, all different, on receipt of eggs of Sparrow or Kestrel Hawk, or any of the Raptors.

SECTIONS of Thyroid Gland and Scirrhus Cancer, stained, ready for mounting, in exchange for Slides (Diatoms preferred).—T. V. D., 33, Sloane-street, London.

SLIDES of fresh-water Algae and Fungi for others of same class or Physiological. Send lists to Dr. Parsons, Goole.

FIFTEEN bottles, each containing from twelve to sixty sections of British and Foreign Woods, in exchange for deep sea soundings (cleaned) or other good objects.—H. L., 6, Upper Phillimore-gardens, Kensington, London, W.

WANTED, British and American Fossil Diatomacea, Earth of Dolgely, Guano Mournie, Loch Boa, Bermuda, Richmond, Nottingham, Suano Ichaboe, &c., for good slides, fossils, Swiss Diatoms, Oran, Santa Fiora, Franzusbad, &c., or cash.—Eug. Mauler, Traverro, Switzerland.

FOR river mud from Lagos send some object of interest or good material for microscope.—A. Smith, 198, Essex-road, Islington.

WANTED, living specimens of *Hydra fusca*; will exchange for unmounted *Sertularia abietina*.—Henry Leipner, 47, Hampton Park, Cotham, Bristol.

GOOD specimens of Moths in exchange for good microscopic objects: *Populi*, *Ligustri*, *Elfenor*, *Bidentata*, *Roborardi*, *Papilionaria*, *Taminata*, *Flavago*, *Persicaria*, *Pembica*, *Crocago*, *Pyramidea*, and many other specimens.—J. Mighall, 2, High-street, Lindfield, Sussex.

LARDNER'S "Museum of Science and Art," 12 vols., in good condition, in exchange for any good works on the microscope.—W. Wilson, 4, Caledonian-place, Edinburgh, N.B.

A NUMBER of Dragon-flies, &c., from the North of Ireland and Diptera, Lancashire, may be had by sending box and return postage to F. Curtis, 32, Woodfield-terrace, Fernhill, Bury, Lancashire.

FOR piece of Cuticle of Aloe send stamped envelope to E. B. L. Brayley, 2, Burlington-buildings, Bristol.

FOR Birds' Eggs or *Lepidoptera* can offer Sponges from the White Chalk, and other fossils from the Red Chalk, small size, suitable for a cabinet.—M. Lawson, High-street, Bridlington.

WANTED, mounted or unmounted Diatoms of every variety in exchange for mounted micro objects.—Atkins, Chemist, 200, Essex-road, Islington, N.

WANTED, microscopical slides in exchange for British flowering plants and ferns (many rare).—T. Watson, Bank Parade, Burnley.

FOR *Foraminifera* and Red Spicules from West Indian Sponge please send slides or unmounted material (good) to E. W. Burgess, 35, Langham-street, London, W.

WANTED in quantity, good typical *Gneiss*, *Amygdaloid* and *Porphyries*. Good exchange given in Fossils, Shells, or Minerals.—Thos. D. Russell, 48, Essex-street, Strand, W.C.

WOULD the gentleman who sent me three slides for sounding please to let me know his address, as I lost his letter?—A. Alletsee, 11, Foley-street, London, W.

FOR specimen of *Sertularia abietina* send stamped envelope and object of interest to Chas. Williams, Kingmeade, Woolcott Park, Redland, Bristol.

FOREIGN or British shells offered for living specimens of the Diving Spider *Argyroseta aquatica*.—Tom Workman, Belfast.

DUPLICATES.—*Edusa*, *Cardui*, *Galathea*, *Cassiope*, *Tanira*, *Pamphilus*, *Agestis*, *Adonis*, *Chrysorrhoea*, *Sambucata*, *Petraria*, *Piniaria*, *Gilevria*, *Impura*, *Chi*, &c. *Desiderata*: *Lepidoptera*.—A. H. Shepherd, 48, Roden-street, Holloway, N.

OFFERS in birds' eggs for a stamp album containing 332 stamps of various countries, including Egypt, America, Spain, Russia, Greece, &c.—J. Wheldon, care of Miss Appleton, Market-place, Darlington.

WANTED, SCIENCE-GOSSIP for 1870, '71, '72, '73, and '74, either bound or unbound; microscopic slides, &c., given in exchange.—W. A. Hyslop, 22, Palmerston-place, Edinburgh.

BOOKS, &c., RECEIVED.

"Physiography." By Prof. Huxley. London: Macmillan.

"A Lecture on Winds, Ocean-Currents, and Tides." By W. Leighton Jordan. London: Hardwicke & Bogue.

"Geological and Geographical Survey of Colorado." By Prof. Hayden.

"Ethnography and Philology of the Hidassa Indians." By Washington Matthews.

"Fur-bearing Animals, a Monograph of the North American Mustelidae." By Dr. Elliott Coues. Government Printing Office, Washington, U.S.A.

"Industrial Art." December.

"Journal of Applied Sciences." December.

"Botanische Zeitung." November.

"Land and Water." December.

"American Naturalist." November.

"Time's Footsteps: A Birthday Book of Bitter-sweet." London: Hardwicke & Bogue.

Last No. of "Monthly Microscopical Journal."

"The Naturalist." December.

&c. &c. &c.

COMMUNICATIONS HAVE BEEN RECEIVED UP TO THE 10TH ULT., FROM:—T. S.—W. W. S.—D. B.—W. J. S.—K. A. D.—H. W. S.—T. B.—J. H. M.—J. M. H.—Dr. M.—T. B.—W. H. S.—R. G.—H. G.—S. T.—W. H. S.—V. C.—T. L.—W. P.—H. W.—G. C.—F. C. K.—W. M. G.—W. R.—J. W.—J. W. G.—W. H. M.—J. J. W. S.—W. G.—T. V. D.—F. H. L.—G. C. D.—H. L.—E. M.—Dr. H. F. P.—J. S. G.—A. S.—W. H. W.—T. R. M.—H. A. B. L.—J. B.—M. J. W.—H. M.—J. M.—E. T. S.—J. H. R.—W. W.—E. E.—G. C. M.—J. B.—S. S. B.—M. L.—W. K.—J. C.—J. F. C.—J. C.—G. C. D.—E. B. L. B.—Prof. G. S. E.—W. E. G.—W. C.—W. A. H.—A. J. R.—L. W. G.—T. T. R.—J. D. O.—G. P.—J. D.—J. T.—W. H. S.—M. S.—W. H. L.—A. A.—C. F. W. T. W.—J. H.—T. W.—A. H. S.—E. F. C.—J. W.—W. J. B.—W. J. B.—E. W. B.—W. W.—T. W.—A. M.—A. S.—D. S.—W. S. W.—J. A., Jun.—J. H. K.—J. C. M.—A. R.—T. R. J.—P. M. D.—D. D.—&c. &c.



THE PRONUNCIATION OF SCIENTIFIC NAMES.

By RANDAL H. ALCOCK, F.L.S.



IT is a source of satisfaction, I should imagine, to all authors, when they find that their works are read; and I feel flattered that Mr. Newlyn should quote from my work, "Botanical Names for English Readers," especially as, in the half-dozen

pages I wrote on the pronunciation of scientific names, I aimed only at giving a few plain, though to the best of my knowledge correct, hints on the subject to those who might wish for them; but by no means at assuming the position of a teacher of this matter to those who, by their knowledge of Greek and Latin, are competent to form a judgment of their own. But Mr. Newlyn, in his article on the pronunciation of scientific names (No. 153, p. 193), has misunderstood my meaning. He says: "Mr. Randal Alcock points out, in a rule, that in words direct from the Greek, especially modern scientific terms, the *g* is pronounced hard"; and remarks, "Really, this is implying that the older terms may go their own way as regards our dealing with this letter in any of them, and the young student in botany must be utterly puzzled in his attempts at utterance of scientific language." Perhaps these words of mine, thus separated from their context, may seem to imply what is stated, but not otherwise. The sentence immediately preceding the one quoted is: "Those Greek words that come to us through the Latin, and have been long in use with us, generally follow English usage, and are pronounced soft, though not always; for instance, both *gymnastic* and *fjynnastic* may be heard." In an earlier part of the same chapter, I endeavoured to show how much pronunciation must depend upon usage, and how futile it is to lay down hard-and-fast rules to meet every case. I have, therefore, not left it to be inferred that any class of terms "may go

their own way," but I have said the rules must be modified by usage.

Mr. Newlyn disagrees with my view that the *g* in scientific names from the Greek should be pronounced uniformly hard, as in *Geum* and *Potamogeton*; indeed, he asserts that it should not be in these cases, though he allows that authorities differ. I entirely agree with Mr. Boulger (No. 152, p. 191), when he says that "a scientific name is a Latin and not an English word, and must be pronounced, if not spelt, accordingly." This being so, the only question is how to pronounce Latin, a question which cannot at present be answered decidedly, as both the traditional English pronunciation and the new pronunciation are being taught. Which will ultimately prevail remains to be seen; but if the new pronunciation become universal, there will no longer be any difficulty, or ambiguity, regarding such names as have been written about in your journal. Mr. T. D. Hall, M.A., in "A Child's First Latin Book," which aims at leading "step by step to the acquirement of the pronunciation of Latin, as set forth by the professors of Latin at Cambridge and Oxford," says, "*c* has always the sound of *k*: as *Cicero*, pronounced *Kikero*; *Cæsar*, *Kaysar*; *civis*, *keevis*; *scilicet*, *skeeliket*; *scio*, *skio*. *g* is always sounded hard, as in *go*, *gun*: as *genus*, *gigno*, *rëgina*." We do not meet here with the pronunciation of *ch*, but in Dr. Smith's "Principia Latina, Part I.," we find, "Latin *c*, *ch* = English *k*." This would give us, or the "utterly puzzled" young student, without any doubt, *Rikardsonia* as the pronunciation of *Richardsonia*; *Rikardia* of *Richardia*, *Lakenalia* of *Lachenalia*; *Füksia* of *Fuchsia*; *Geranium*, *Potamogeton*, *Geum*, with *g* like *g* in *gun*.

I am very much in favour of the new pronunciation myself for many reasons, which it is not necessary to enter upon. I merely say that it has been arrived at by competent authorities, and is now very extensively taught. "The usage of our universities" is rather a vague expression, as they do not all agree; and so long as we have English teachers who have studied abroad, and distinguished foreign savans visiting us

here, there must always be a certain amount of latitude allowed, if we retain the English method of pronouncing Latin. We may say *Fewschia* or *Jeranium* to an Englishman, but who would do so to a German?

I cannot see, then, that the pronunciation of many of the names can at present be reduced to strict rules, which any one would feel bound by; *scirpus* is pronounced *sirpus*, according to the old style; *skirpus* according to the new, &c.; but in the case of quantities, I think absolute uniformity might be arrived at, which is not the case at present. If I were to ask, what are the correct accentuations of *Conium*, *Cyperus*, *Populus*, for instance, I should not expect to receive uniform replies.

As to the euphony of the names, those who have to apply them are responsible, and they are supposed to have sufficient knowledge of plants, and the system of nomenclature, to give correct names: much of what remains depends upon taste. "It is certain no one ought to name a plant, if he is not a botanist; nor is any one at liberty to impose a generic name who does not understand genera; on the other hand, we have no doubt that any one who knows that a plant is perfectly distinct generically from all others, also knows how to apply a distinct name" (Linn. "Crit. Bot.," § 218). It is true that names are not always everything that might be desired, nor have they always been correct; but if correct, they should not afterwards be altered. Euphony does not entirely depend upon the taste of the plant-namer, for often he has little choice. Thus, as Jacquin wished to do honour to Patrick Browne, and named *Brownea* after him; Smith, when he wished to honour Robert Brown in the same way, had to invent a fresh form, and therefore named his genus *Brunonia*; Linné having already used *Brunia* in honour of Lebrun.

Mr. Newlyn is scarcely correct in saying that *Brownea* and *Brunonia* are "etymologically identical," for, not only are they derived from the names of different people, but also, in the first case, the name was spelt *Browne* and in the second *Brown*. Hence *Brownæa*—*Théis* has it *Brownæā*—not *Brownæa*, which it would have been but for the final *a*. It is well these minutæ should be noticed, else "both the complimentary importance and the etymological form might be sacrificed."

I have not hitherto felt inclined to take any part in this controversy, because, if common usage be taken into account, no decisive answers can be given to the questions asked. Thus "E. C." (No. 151, p. 164) argues that the *ch* in *Lachenalia* should have the sound *sh*, because it was "named after M. de la Chenal." De Théis says it was named after Werner Lachenal, professor of botany at Bâle. Whether he was a pure Frenchman, or a pure German, or a German of French extraction, I do not know; but if he were the latter, as his Christian name, and changed surname, would seem to indicate, there is still no certainty how

he pronounced his own name, for the Germans themselves do not pronounce *ch* in a uniform manner; some would pronounce it *k*, some *ch*, as in the Scotch loch, some *sh*; and there are also intermediate sounds between these to be met with. According then to "E. C.'s" idea, he may call *Lachenalia* what he chooses without being incorrect; but certainly Mr. Boulger's view that it should be pronounced as though it were spelt with a *k*, because it is a Latin word, seems more reasonable. We cannot follow the pronunciation of all languages in commemorative names, but must take them as Latin, and pronounce them accordingly. *Magnol* pronounced in French, does not correspond with *Mag-nô-lia* pronounced in Latin.

I repeat, in conclusion, my opinion that when we have a uniform pronunciation of Latin, we may have a uniform pronunciation of botanical names, but not until then. In the mean time, as Mr. Newlyn says, "the pronunciation of botanical names is but of secondary importance," and I have taken my pen up now, only because Mr. Newlyn has misunderstood what I have previously published on this subject, and, unintentionally no doubt, misrepresented my meaning. This is the general teaching of my book, with regard to the pronunciation of the letter *g*, in botanical names. In names direct from the Greek, it should be pronounced hard; e.g., *Geophlia*, *Georchis*, *Geropogon*. But if the student always hears the *g*, in such words as *Genista*, *Gentiana*, *Geranium*, in the British Flora pronounced soft, let him pronounce it soft, though *Geranium* is a Greek name of *Dioscorides*; or, if he sees, judging by analogy, that according to English usage, such names as *Gerardia*, *Geoffroya*, *Gilia*, would be pronounced soft; let him follow that usage. I would add, that if he should be in doubt about such names as *Gireondia*, *Gesnera*, *Genipa*, *Giukgo*, let him pronounce the *g* hard. I hope it may be pronounced so before long in every case.

THE SEALS AND WHALES OF THE BRITISH SEAS.

By THOMAS SOUTHWELL, F.Z.S., &c.

THE SPERM WHALE (*continued*).

No. VII.

THE pursuit of the Sperm Whale is attended with much greater danger than that of the Greenland Whale, and Beale gives many instances in which, in his own experience, boats were stove in and men lost; stories of fighting whales, he says, are numerous, and probably much exaggerated; one, known as "Timor Jack," is said to have destroyed every boat sent against him, till at last he was killed by being attacked from several directions at the same time, thus diverting his attention from the boat which made the successful attack. Another fish, known as "New Zealand Tom," destroyed nine boats successively

before breakfast, and when eventually captured, after destroying many other boats, many harpoons from the various ships which had attacked him were found sticking in his body. There is one well-authenticated instance of a vessel being attacked and destroyed by a sperm whale: the American whale-ship *Essex* was attacked by one, which, first passing under the vessel, probably by accident, came in contact with her keel and carried it away; then turning and rushing furiously upon the ship, the whale stove in her bow; so serious was the breach that the vessel speedily filled and went down. Most of the crew were away in their boats at the time, but those on board had just time to launch their one remaining boat before the vessel sank. The boats made for the coast of Peru, the nearest land, many hundreds of miles distant; one of them was picked up drifting at sea, and three of the crew, who were found in it in a state of insensibility, were the only survivors of the ill-fated vessel.

In addition to the sperm and oil, this species yields another product which is, or was, very valuable, although it is the result of disease, and one would imagine a very uninviting substance—I refer to *Ambergris*, the origin and composition of which was so long a puzzle to the learned. This substance is now well known to be a concretion of the indigestible portions of the Cuttle-fish, which form the food of the Sperm Whale. The nucleus of the mass is generally the horny beaks of these creatures, and the substance itself is found in the intestines of the Sperm Whale, or on the shores of the seas frequented by this species; no other whale is known to be subject to these bezoars. It was formerly believed that the origin of ambergris was in some way connected with the sea, and when it was afterwards found in whales, the fact was simply attributed to their having swallowed it. Sir Thomas Browne writes of the Sperm Whale which came on shore at Wells, in 1646:—"In vain was it to rake for ambergris in the paunch of this leviathan, as Greenland discoverers and attests of experience dictate that they sometimes swallow great lumps thereof in the sea; insufferable fœtor denying that inquiry; and yet if, as Paracelsus encourageth, ordure makes the best musk, and from the most foetid substances may be drawn the most odoriferous essences; all that had not Vespasian's nose (*Cui odor lucri ex re qualibet*) might boldly swear here was a subject fit for such extractions" (p. 356, vol. i.). It was not until 1783, in a paper read before the Royal Society by Dr. Swediaur, that a scientific account of the origin of ambergris was made known. At the present time its medical virtues, which were formerly considered very great, are altogether at a discount, and the only use to which it is applied is in the preparation of perfumery.

I have said very little about the method of pursuit and capture of this species and of the Right-whale, because it is a subject in which I take no pleasure;

those who wish to know how these peaceful and highly-organized giants are approached, and how they behave when terrified and smarting under the harpoon and whale-lance, can pursue the subject *ad nauseam* in the pages of Scoresby, Beale, and others; the sickening process of "flensing" and disposing of the blubber is described with equal minuteness. I for one cannot appreciate the halo of romance with which some authors seek to surround the whale-fishery. Doubtless the occupation is one of hardship and danger, but the remuneration when successful is in proportion, and I can hardly conceive of men inflicting the fearful amount of suffering which every "full" whaleship, or in a still greater degree every "full" sealer, represents,—under any circumstances. Science is constantly adding to our resources, and it is sincerely to be hoped that ere long substitutes may be found for animal oil and whalebone which will supersede their use in the few processes in which they are still requisite: should this be long delayed, it is to be feared that the seals and whales, at least of the northern seas, will soon cease to exist.

Although so widely spread over the waters of the globe, possessing, I believe, a range greater than any other known species of animal, it is only open and deep waters which can be said to be the home of the Sperm Whale; and when found in shallow seas, its generally emaciated condition indicates the absence of its proper nourishment; and the readiness with which whole herds precipitate themselves stupidly upon the sands, shows how little they are acquainted with such objects. Mr. Andrew Murray makes some observations upon this subject, which are so interesting and so suggestive that I must ask you to excuse my making a long quotation.

Speaking of those specimens which have now and then been cast ashore in the North Atlantic or in the English seas, he says: "They seem to be unprepared for, or not adapted for, shallow seas. Accustomed (perhaps not individually but by hereditary practice or instinct) to swim along the coral islands of the Pacific within a stone's throw from the shore, they cannot understand, their instinct is not prepared to meet, shallow coasts and projecting headlands. If they were habitual residents in our seas, they must either be speedily extirpated, learn more caution, or be developed into a new species." . . . Mr. Murray further says: "I observe that almost every place that has been above mentioned as a favourite resort of the Sperm Whales, although not out of soundings, has claims to be considered the site of submerged land. The islands of the Polynesia, which are its special feeding-ground, are the beacons left by the submerged Pacific continent. In pure deep seas animal life is usually scarce, and the absence of breeding-ground is probably the chief cause of it; but this only applies to a certain kind of animals, those which require a bottom on which to

deposit their spawn; but there are many which do not require this. The spawn of some floats about unattached; for others a frond of weed is sufficient attachment; and it has occurred to me that the distribution of the Sperm Whale may in some way be connected with the geological antecedents of the ocean it inhabits. I think it not improbable that the



Fig. 12. Chair in Great Yarmouth Church formed of the basal portion of the skull of a Sperm Whale (from Palmer's "Perlustration of Great Yarmouth").

site of a submerged land may swarm with life, which originally proceeded, or was dependent on it, long after it had been in the deep bosom of the ocean buried. The Sargasso seas, which swarm with *Eolidæ* and *Crustacea*, are examples of this life: it is not invariably either present or absent in deep water, and it is its presence or its absence which is instructive. Those animals which required a bottom to spawn upon may have died out or been developed into others which do not; and those which do not require such a support may have multiplied correspondingly. In one of the maps in Lieutenant Maury's book, already cited, there is a space of sea opposite the western coast of South



Fig. 13. Under surface of the Chair (from same work).

America, and lying between Patagonia and New Zealand, marked 'Desolate region, distinguished by the absence of animal or vegetable life';—no sperm whales here—nothing for them to feed upon—and no symptoms, either by banks of Sargasso or coral islets, of any land ever having existed there. There is no apparent reason why this place, except from some special cause peculiar to itself, should be more desolate than any other in the same latitude—than the deep sea on the east side of Patagonia, for example. I can imagine that, if the bottom of the sea should subside gradually, where animal life had once abounded, animal life—not that animal life, but animal life due

in some way to it—might continue to linger over it long after it had passed beyond the depth at which it could practically have any effect upon the animal life above it; but if a part of the circumference of the globe has always been under water, before and ever since the creation of life, no life is likely to be found on that spot, because it has never had a starting-point of life from which to begin; and, as already said, a slender barrier stops the spread of species, and species would certainly not spread to a spot where there was nothing for them to feed upon. Again, animal life could not begin to feed upon animal life till vegetable life had previously prepared the way by providing food for the animals which were to furnish food for others; and vegetable life could not begin to grow without a foundation of land, accessible either above or below water. The total and constant absence of all life at any particular spot appears to me, therefore, to furnish a presumption that there has never been dry land or shallow water there. Whether the continuance of deep water in one spot for some

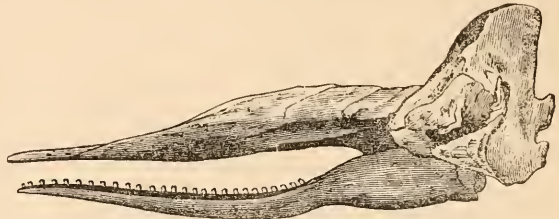


Fig. 14. Skull of Sperm Whale.

interminably long time might not have the same effect is another question, which, whatever way it may be answered, would not affect my explanation of the cause of the absence of the Sperm Whale from such spots.* I am indebted to the kindness of Chas. J. Palmer, Esq., of Great Yarmouth, for the woodcuts (figs. 12 and 13) representing the chair in Yarmouth Church which is formed of part of the skull of an individual of this species.

The sub-family *Ziphiine*, which follows next, is, perhaps, the most remarkable of the whole of this interesting order. The *Ziphioid* Whales, as they are designated, are, with one exception, very rare, and until the commencement of the present century, with that one exception, were known to science only from their numerous remains, found chiefly in the Crag deposits. "Since that time, however," says Prof. Flower, in his memoirs of this group (Trans. Zool. Soc., vol. viii. p. 203), "at irregular intervals, in various and most distant parts of the world, solitary individuals have been caught or stranded, now amounting to about thirty, which by some naturalists are referred to upwards of a dozen distinct species, and to very

* "Geographical Distribution of Mammalia," pp. 211-213.

nearly as many genera. No case is recorded of more than one of these animals having been observed in one place at a time, and their habits are almost absolutely unknown. . . . This comparative rarity at the present epoch," he farther says, "contrasts greatly with what once obtained on the earth, especially in the period of the deposition of the Crag formations, and leads to the belief that the existing Ziphioids are the survivors of an ancient family which once played a far more important part than now among the cetacean inhabitants of the ocean, but which have been gradually replaced by other forms, and are themselves probably destined ere long to share the fate of their once numerous allies or progenitors."

The members of the group may be distinguished at once by the absence of functional teeth in the upper jaw: those in the lower jaw are always quite rudimentary, with the exception of one, or occasionally, two pairs. These may be largely developed, especially in the male sex, and are placed, generally, well forward. The blow-hole is sub-crescentic, and a pair of remarkable furrows occur in the skin of the throat, almost in the form of the letter V, the point directed forward. The skull presents a remarkable appearance in the genus *Hyperoodon*, caused by the enormous maxillary crests which produce the peculiar conformation of the head in the living animal, originating the trivial name "Bottle-head." The common BEAKED WHALE, or BOTTLE-HEAD (*Hyperoodon rostratus*, Chemnitz), is of frequent occurrence in the North Atlantic, and generally visits our shores in autumn, sometimes ascending the estuaries of rivers: it has been taken several times at the entrance to the river Ouse. It is solitary in its habits, more than two are never met with in the same place, and in that case it is often the old female and her young one: the old male is said to be very shy and rarely secured. In September, 1877, an adult female, 24 ft. long, was taken in the Menai Straits; it was accompanied by another, probably its young one. The colour is black above, the under parts being lighter: the two teeth in the lower jaw are generally hidden in the gum. Its food consists of cuttle-fish, the remains of great numbers of which have been found in its stomach. Another species of *Hyperoodon*, *H. latifrons*, has occurred three or four times on the British coast; it has also been taken in Greenland. Very little is known about it as a species, and that only from its bones: it is supposed to attain a greater size than *H. rostratus*, probably upwards of 30 ft.

CUVIER'S WHALE (*Ziphius cavirostris*, Cuv.), another of this remarkable group, has been met with once on the coast of Shetland, and it, or its remains, have been found about five or six times in other parts of Europe, and also, it is believed, at the Cape of Good Hope, and the east coast of South America. It has two teeth, one on each side the lower jaw, close to

the extremity. Cuvier established the genus *Ziphius* in 1825, from a fossil skull found on the coast of Provence, in 1804, which he believed at the time to belong to an extinct animal.

(To be continued.)

STRUCTURE OF SAND-HILLS.

By W. B. GROVE, B.A.

LAST summer I had a very good opportunity of examining the structure of the *dunes* on the Lancashire coast. A copy (fig. 15) of a sketch, made on the spot, may be interesting, as I can find none in our common text-books which give an accurate idea of it. It was taken from a natural section of a hill about 14 feet high, half of which had been neatly blown away by the wind. The irregularity of the bedding, represented by the darker lines, is due to

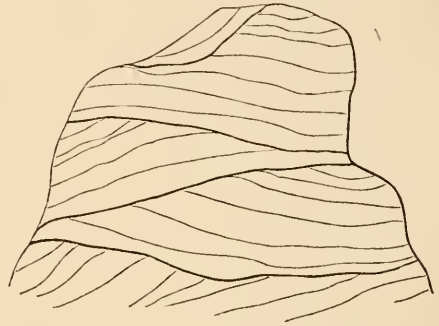


Fig. 15. Section of Sand-dune, Lancashire.

changes in the direction of the wind, which, after depositing a stratum, often sweeps away a part of it; and then, after another change, deposits fresh material on the new surface. As the successive laminae conform accurately to the varying outline of

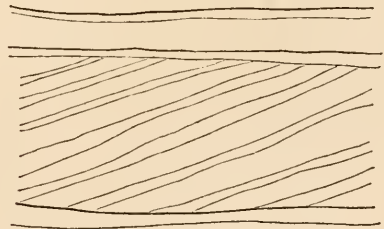


Fig. 16. Sandstone Cliff, Suffolk (after Lyell).

the surface on which they are deposited, a series of irregular beds is thus produced. This is often called *false-bedding*. The same name is also applied to *diagonal stratification*, in which the planes of the laminae of sandstone are oblique to the plane of stratification, as seen in fig. 16. But this latter structure can only be formed, I believe, when a current of water, carrying coarse sediment, meets with a sudden

check to its velocity, and lets its burden fall; the particles then arrange themselves at the proper "slope of repose," which depends upon their size and form. This can seldom or never happen to a current of air on a large scale, and consequently diagonal stratification will rarely occur in sand-dunes.

My reason for repeating these well-known facts is that, in J. Geikie's small "Geology," I find the following passage:—"Sometimes the layers of deposition in a single stratum are inclined at various angles to themselves. This structure is called *false-bedding*; the laminae not coinciding with the planes of stratification. . . . Hillocks of drifting sand frequently show a similar structure, but their false-bedding is, as a rule, much more pronounced." The first two sentences of this passage contain slightly different ideas, and must confuse the student's mind. According to my observation, moreover, the statement in the last sentence is not true, if he takes the latter of the two definitions apparently given of false-bedding, as he would naturally do. It is best not to use the term *false-bedding* at all, but discard it, as is done by Lyell and Jukes, in favour of the two, *irregular bedding* and *diagonal stratification*. The latter of these cannot be called by the rejected name, as it is not the bedding but the lamination that is abnormal; we may, indeed, apply the name to the former, but we shall have to explain that *false* means *irregular* in this case, and we do not gain much, except the opportunity of writing a second sentence to explain the meaning of the previous one.

THE CLASSIFICATION OF THE FORAMINIFERA.

BY W. K. MARRIOTT.

THIS was the subject of a paper recently read before the Metropolitan Scientific Association. The author referred to the *Eozoon Canadense*, and while giving a brief recapitulation of the arguments in favour of its organic origin, he held it up as not only the first of all foraminiferous life, but also, in its special capacity as a rock builder, as typical as the very *Globigerina* itself. He considered as inimical to the claims of the Eozoon that Messrs. King and Rowney, the leaders of the opposition, had lately received a grant from the Endowment of Research Fund, for "Researches to determine the Structural, Chemical, and Mineralogical Character of a certain Group of Crystalline Rocks." If this were aimed at the Eozoon, he was content to leave the matter in their hands, feeling confident that its position in the animal world was assured. After referring to the utility of classification in general, he showed how the classification of the Foraminifera had been alternately neglected and over-indulged in; how in the one case it was left to itself, and in others had

been filled with synonymes, and how M. D'Orbigny had rescued it, and how he again had spoiled it. He then showed the system of the classification of the whole Protozoic group, and how its two great branches, the Rhizopoda and Ciliata, develop on the one hand, through many stages, up to the many-chambered Foraminifera, and on the other to the Actinophrys and Vorticella. He regretted he could at present do no more than indicate the great question that lay open at this point, namely, how these two developments of Protozoic life are related to the supplementary groups of Polycystina, Thallascollida, and Spongiada, and to the Ichthydina and Noctilucida. As the classification of the Foraminifera rests, by reason of the simplicity of its animal matter, upon no physiological basis, it remains very clearly that it can only be upon the structural difference of its shell; this, again, being due to the hardening, with only very slight modifications, of the outside of the creature—the calcifying of its epidermis, as it has been somewhat curiously called; this classification rests on very reasonable and simple grounds. The necessity of the first great divisions into Monothalamia and Polythalamia immediately suggests itself. The Monothalamia, or one-chambered Foraminifera, consists of three families. The first, and largest, in point of genera, is the *Lagyniida*, so called from the flask-like shape of its members. Specimens were shown under the microscopes in the table, and were found to exhibit every variety of form of flask that ever left the hand of the potter. This distinctive feature was also shown upon the black-board; indeed, Mr. Marriott materially assisted his audience in understanding the principles of the classification by sketching thereon typical genera of all the families, giving the salient points in the structure of the shell by which the creature earned its name and position. The second family, *Orbulinida*, has but one member, but this is the interesting *Orbulina* that the *Challenger* Expedition has brought prominently to the front; its points of resemblance to the *Globigerina* were dwelt upon, and also its curious divergences from that genus. The third family, *Cornuspirida*, was then shown, and its great apparent resemblance to our fresh-water mollusk, the planorbis, at once fixed it on the mind; this concluding the *Monothalamia*. The grouping of the *Polythalamia* was next shown, but here a greater number of families are found, and consequently intricacies of various kinds to be encountered. The first group, the *Helicoidea*, contained every spiral-shaped Foraminifera there was, and some, like some of the members of the first family, that were not spiral at all, but simply possessing more chambers than one. These were the *Miliolida*, from their resemblance to millet seed. The second family, *Turbinida*, possessed, with many variations, a shell like the well-known mollusk *Turbo*, and specimens of this family are found in all collections. A sub-family of this, called, from its clustering and grape-

like form, the *Uvellida*, contains the world-famed Globigerina. And another well-known sub-family, the *Textilaria*, shows a curious conformation of a spiral that produces the appearance of being woven. Then comes the second great family of the Polythalamians, the *Nautiloidea*, that led M. D'Orbigny into the error of classing them with the Nautilus and Ammonite. A reference to specimens showed how far he was justified in this. The first sub-family, the *Cristellarida*, the second *Nonionida*, third *Pencroplida*, and fourth *Orbentina*, contain well-known genera that, either in outward form or inward structure of cell and segment closely mimic the form of that great class from which more recent investigation has banished them. The remaining two families were then enumerated, and the *Orbitulita*, as being the most interesting belonging to them, was detailed, after which the *Rhaboidea*, the second great group, or rod-shaped Foraminifera, was explained. This possesses but one family, the *Nodosarida*, whose knot-shaped chambers, arranged one on another, enables everybody at once to identify them. This brought the classification to an end. Mr. Marriott, in conclusion, passed on to the life history of one of the Foraminifera as typical of the whole of the class. He chose the Globigerina, because round it has centered the most popular and scientific interest and research, and gave the most recent investigations and speculations on the subject.

A VISIT TO SPONSA'S HEADQUARTERS.

BY H. C. DENT.

AFTER reading the two papers on "Lepidoptera of the New Forest" and "Sport in the New Forest," our hopes were roused, and we arranged to go to that Elysium in the long vacation. As my brother was not free till the first week in August, I filled up some of the spare time in visiting Darenth Wood, Box Hill, and Epping, in successful quest of the spring species; and at the end of June went for three weeks to Switzerland, and visited its glaciers, snow-peaks, and insect hunting-grounds. Here I must wander, and give a few localities for those who propose a trip to that glorious country next season. The upper end of the Lauterbrunnen valley, near Trachsellauenen (very good little inn) is a splendid place. Here, while revelling in the sight of the Jungfrau, Mönch, and many other superb peaks, you may take *Machaon*, *Arion*, *Hyale*, *Cratægi*, *Globularia*, *Trifolii*, *Lonicera*, *Granmica*, two kinds of large copper, and many foreign species of blues and fritillaries; on the Chaumont near Neuchatel, *Apollo* and *Podalirius* abound (also the most atrocious and pertinacious *Diptera*); at Grindelwald I captured four superb *Machaons* at one fell swoop; the Nicolai Thal—and in fact the Zermatt district generally—with the vineyards above Saxon (Rhône Valley) well

repay a visit; while at Gryon, near Bex, *Dia* and other rare fritillaries abound; besides *Sinapis*, *Hero*, the *Zygenida*, &c.

To return. We arrived at Brockenhurst on August 8th, and put up at the "Rose and Crown" (proprietor, James Ings), where we had, a week previously, ordered beds. Nothing could be more cheerful than our rooms, and during our whole stay we were most comfortable, while the charges were reasonable. After a good lunch, we sallied forth for a couple of hours, and—considering that the weather was bad—obtained a very fair "bag." In the evening, however, we were not so fortunate, as we only took one *Promissa* and a few *Pyramidea*; although the weather was suitable, rarities would not appear.

The next morning we went through the Forest to Lyndhurst, on the right side of the road for about halfway, and then on the left. We saw innumerable *Paphia*—all more or less rubbed—two *Sibylla*, and "battered" a female *Iris*! This splendid lady was sipping the nectar from a bramble blossom, when down came the net over her, but, alas! her imperial majesty quietly glided downwards through the thorns, evading the death-dealing gauze, and soared triumphantly to the top of a neighbouring oak. This damped our spirits, but they soon rose when we captured two *Argiolus* and a pair of *Quercus*. The latter we found very abundant at the tops of young oaks; so at length we devised a plan for their capture, and having cut down a straight birch "stick" of about 15 ft. long, and fixed a net at the top; after two days' practice we succeeded in taking eighty specimens in less than a couple of hours; the abominable Forest flies tormenting us all the time above measure. We saw daily a few *Iris* besporting themselves above and around the high oaks, but they were inaccessible.

From August 8th to 10th, the weather was unpropitious; as clouds, wind, and rain are not compatible with fly-catching. However, as we liked the sylvan beauties of the places we had visited, and as we feared "to go farther and fare worse," our daily plan was to start from the "Rose and Crown" about nine, go through the Forest to Lyndhurst (about three miles direct), where we arrived about one. Then after lunching at the "Crown and Stirrup" (three minutes from forest, proprietor Charles Pack, who lets apartments), we returned through the Forest, arranged our captures, dined, and set off for sugaring.

At length we were told of a place where *Sponsa* was said to abound. "Some gentlemen 'uv took forty a noight this season," said our informant. Thither we determined to go, and the following evening (August 13th) we started, equipped with bags full of empty pill-boxes, chloroform and cyanide bottles, and corked boxes well stocked with No. 6 pins. We arranged to sugar 150 trees, and keep on visiting them till we were tired. We had sugared over 100 when an individual approached armed with a net, a

cyanide-bottle and a corked box. We tackled him. "Any *Spona* about? Wy bless yer, 'eaps on 'em. Thur's one on that thur tree now." Our blood was up, we longed to dart at it, but it was that man's tree, and we refrained. He told us he had taken 120 in three nights, and that his usual nightly haul was from twelve to twenty. We asked him how many trees he "painted." "Wall," he said, "I begun doin' about thirty, but w'en they're plentiful I doaint have no time to look at more'n about six trees; there's ten on a tree sometimes." We were roused to mad excitement; in half an hour we had taken a dozen on as many trees. Many flew off, and that night we had no nets. It was now 8.30, and we met our friend going home. "They're ovur for to-noight," said he. We stayed another half-hour, but took only a couple on his trees.



Fig. 17. Dark-crimson Underwing Moth (*Catocala spona*).

The next night, having found that *Spona* flew early, we sugared earlier, and before dark had taken another dozen *Spona*, and two or three *Promissa*, besides the rare *Subsequa*. We had intended going to the Isle of Wight on the 15th for *Hyale* and *Helice*; but another *Spona* hunt was not to be winked at. That night we captured twenty-one *Spona* and two *Promissa*, while the multitudes of *Pyramidea* were as usual a perfect pest.

To see whether any *Spona* are settled on sugar needs some practice, when their wings are folded over their backs—especially in the dusk—as the upper wings resemble closely the bark of the trees; when, however, the wings are partly expanded—showing the splendid crimson bands—I can hardly imagine a more exciting sight; the very thought of it makes me thrill even now. Our mode of proceeding was to pill-

box the moths, pour in a drop of chloroform, and when they were quiet, pin and remove them to the corked box. When we got home they were stabbed with oxalic acid. If they were too wary for the pill-box or cyanide-bottle, we netted them, and then pill-boxed. We thus found half a dozen pill-boxes ample.

At length, on the 16th, we left Brockenhurst with sad hearts, took the train to Lymington, and steamed across the Solent, at the rate of four miles an hour, under a hot sun, to Yarmouth, in company with a flock of sheep and a fat farmer, who was much wrapped up and enduring all the agonies of sea-sickness. We were greeted by numerous *Edusa*, *Cardui*, and *Polychloros*, besides innumerable *Atalanta*. Having "humped" our knapsack, we marched on the west side of the Yar to Freshwater. Wishing to be near the sea, we scorned the respectable Red Lion Inn, and put up at the Albion, Freshwater Bay, where we were duly charged next morning. That afternoon we walked towards Alum Bay, but a strong gusty wind prevented anything more than a grand view from the beacon above the Nodes, and the capture of a few *Corydon* and *Edusa*. As the weather continued unfavourable the next morning, and it was incumbent upon us to be in London by Saturday, we threw over our plan of walking to Shanklin, Ventnor, and Cowes, and determined to have another evening at *Spona*'s headquarters. We therefore went back to Yarmouth, where we netted many *Edusa*, *Galathea*, *Cardui*, and a hibernated *Helice*, and then returned to Brockenhurst. We were rewarded: over two dozen *Spona* required our endeavours before 7.45, when the moon shone brilliantly, and the underwings retreated to the tops of the oaks.

This brought our Hampshire expedition to a close, and the next lepidoptera I saw—three days after—were some *Edusa*, *Io*, *Cardui*, &c., in the picture-galleries of The Hague, Haarlem, and Amsterdam, calmly sitting round and settling on bouquets which, though painted a couple of centuries ago by Mignou, Ruysch, and others, still retain much of their original freshness.

The following is a list of thirty-one *diurni* we saw in the New Forest:—*Rhamni*, *Edusa*, *Brassicae*, *Rapee*, *Nafi*, *Galathea*, *Aegeria*, *Hyperanthus*, *Megara*, *Semle*, *Tithonus*, *Javira*, *Pamphilus*, *Sibylla*, *Atalanta*, *Io*, *Polychloros*, *Urticae*, *Cardui*, *Iris*, *Quercus*, *Betule*, *Adippe*, *Agluia*, *Paphia*, *Phleus*, *Argiolus*, *Alexis*, *Artaxerxes*, *Sylvanus*, and *Linea*. We were informed that this year had been bad for *Valezina*, and especially for *Sibylla*. Of the latter we only saw half a dozen, while ten days before they were abundant in Essex. *Orion* and *Batis* had been plentiful.

A PLEA FOR THE MICROSCOPE AS A TOY.

WE are often reminded that the microscope is no longer a toy, but a scientific instrument, and those who use it for recreation only are not unfrequently hard hit, as mere wasters of time and desecrators of a noble power.

Now, while fully appreciating the scientific use of the microscope, I would suggest a slight alteration in the above dictum, and say, it is *not only* a toy, but a scientific instrument. I would plead for it as a source of amusement. The President of the Quekett Club, in his recent address, reminds us of a remark in the first page of the "Microscopic Journal" of 1841, where it is said of microscopic research in those days, that it "is for the most part an amusement rather than a profession"—it is an "intellectual pastime, which is sure to terminate in beneficial results. General knowledge may be acquired by observation," and this "by industry and perseverance imperceptibly produces recondite science." This is just the view I would take of microscopical employment. It is first an "intellectual pastime." Wearied in body and mind the man of business or of literature seeks rest. Some find it in mere lounging in an easy-chair, and joining in the family chit-chat; others in listening to the music which a wife or daughter elicits from the pianoforte. There is no objection to this; but if the taste leads to the observation of nature in the sky, the earth, the sea, then a special interest is felt in whatever tends to reveal the secrets of that existence by which we are surrounded. Some turn to the telescope, others to the microscope, not as a means of scientific research, but as "an intellectual pastime." Investigation requires powerful effort, both of mind and body. Few have this to expend now-a-days on what does not bring grist to the mill. The mind wants recreation, as the appetite longs sometimes for change of diet and enjoys the dainty bit. The holiday keeper rushes into the country, not to study, but to enjoy, its beauties. He visits the picture gallery, not to become an artist, but to satisfy a taste. He goes to the British Museum or the Zoological Gardens not to become a naturalist, but to enlarge his ideas. He cultivates a variety of sweet and pretty flowers in his garden, not with the remotest intention of becoming acquainted with their orders and relationships, but purely for the enjoyment to be derived from them. And why may a man not use his microscope in the same way? What wonders—what beauties—does it reveal! Well has it been said that the microscope is a door into another world. It is so, and the man who uses it merely as such is amply rewarded. The door is opened and he is almost bewildered with the variety and beauty of what he sees. His mind is enlarged, his views are corrected; his taste is charmed, his wonder excited. The whole man is elevated, refreshed, and invigo-

rated. It is not only a pastime, but "an intellectual pastime."

But, further, we are told it is "sure to terminate in beneficial results." This "intellectual pastime," then, does not as a rule stop there. It is not a lovely vision which vanishes away, but is an avenue to a brighter and broader view. It induces the habit of observation, and surrounds even the least things with a halo of interest which they could never otherwise have possessed. The smut on the ear of corn—the disease of the leaf of the potato—the mould on the cheese—all are now full of interest. The most unpromising object often exhibits a most unexpected character, or reveals a long-looked-for secret. And thus the mind is not only refreshed but stored with a new fact, which in its turn proves to be only the cradle of another: so, step by step, the "beneficial results" are evolved. And great as these are in an educational and abstract point of view, they are by no means wanting in a practical, as the application of the microscope to physiological, histological, and commercial subjects, abundantly proves.

Let us begin, then, by play. If it ends here it is at least as innocent and pleasing as any other—let some of us begin by using our microscopes as toys, let others use them so sometimes, for the amusement of the uninitiated—it is "an intellectual pastime which is sure to terminate in beneficial results."

This toy, moreover, is not an expensive one, either to begin with, or to keep going. If you buy a gun there is the annual licence, and the constant supply of ammunition. If you buy a horse, the first outlay is nothing compared with the keeping of it. But when once you are provided with a microscope, there is no tax to pay, no food required. Let this be a plea for getting a fairly good instrument at first, capable of being added to as required. Even the magic-lantern soon tires unless new slides, which are very costly, be continually added. Having, then, this toy, we learn to find objects which cost us nothing, but, on the contrary, contribute largely to our pleasure and profit. It has, too, a great advantage over the telescope. You have not to wait for cloudless nights, nor to run the risk of colds and neuralgia. Every night is a microscopical night, and the long dark evenings of winter may be not only beguiled but improved.—T. R. J., *Codicote Vicarage*.

PARASITES ON FISH.

By JOHN DAVIS.

THE subject of the various parasites found on fish has not hitherto received much popular attention, except in Van Beneden's "Animal Mess-mats." It is hoped, therefore, that the following description of three of such parasites may induce other naturalists to contribute further information on this subject to the pages of SCIENCE-GOSSIP.

Parasite of COD (*Gadus morrhua*) taken from the outside of the gill (there is another parasite which infests its back).—The tail is composed of two tubes, finely marked, which commence at the end of the animal at each side, and gradually narrow until they meet. These tubes are nearly as long as the body.

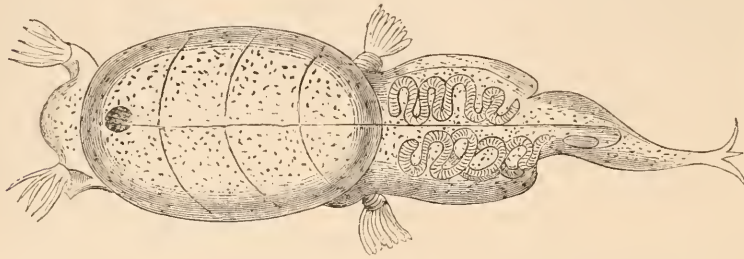


Fig. 18. Parasite of a Ling; 3-inch object; size, $\frac{9}{13}$ × $\frac{3}{16}$; pale yellow and pink spots, with a dark brownish-pink eye.

The size of the specimen is $\frac{5}{16}$ of an inch, and the objective used in this instance was $1\frac{1}{2}$ -inch, with C eyepiece.

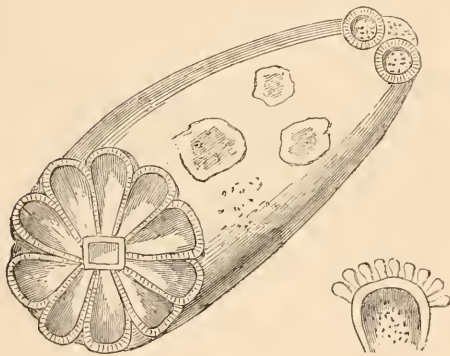


Fig. 19. Parasite of Gurnard.—This parasite infests the eye of the fish; it is a milky-white in colour and $\frac{1}{4}$ inch long; it moves about like a caterpillar; $1\frac{1}{2}$ -inch A eyepiece.

Parasite of LING (*Molva lota*).—The integument of this parasite is covered with small spots and lines, and the body is of a dense opal-white. An indistinct œsophagus (on account of the thickness of the animal) can be traced from the eyespots to the stomach. The latter is composed of a spiral arrangement of tubes, and marked with cross-lines, the same as the antenna of the Lobster. It is a pretty sight to watch the circulation in these vessels. At the dorsal end is a rather large cavity, which I take to be the ovary. The size of this parasite is $\frac{9}{14}$ × $\frac{9}{16}$, and examined through a 3-inch objective. It was taken from the back of the fish.

The GURNARD (*Trigla hirundo*) has parasites: this one was taken from the eye, to which it fastens itself by the large wheel-like sucker; it then bends its body until it brings the small rings at the end of the animal on the fish, and so jerks itself along. I have drawn one end of the large sucker, as seen under



Fig. 20. Parasite of a Cod; $1\frac{1}{2}$ -inch; size, $\frac{5}{16}$; opal-white, with a pink eye-spot and dots.

a $\frac{1}{4}$ -inch objective. The length of this parasite is about $\frac{1}{4}$ inch, and perfectly white.

WHITE MITES.

DURING the month of June, 1877, whilst driving in the country, I observed a black poplar tree evidently suffering from the ravages of insects; I therefore stopped the vehicle, and got out to examine. I found the tree bored in many places by the larvæ of the Goat-moth (*Cossus ligniperda*), three of which I secured. A considerable portion of the bark was loose, and the sap kept this quite wet, the peculiar smell produced by the larvæ being very evident. On removing a portion of the bark where it was moist with sap, I found it covered with a moving mass, consisting of myriads of very peculiar White Mites. On examining them under the microscope, I found them to differ from any Mites I had ever seen, nor could I find any notice of similar ones in any work to which I could refer. The females, which were in the greatest abundance, were egg-shaped, the larger end being in front, and the sides towards the posterior, somewhat bent in. On slightly compressing them, they were seen to contain eggs. The abdomen was of a milk-white colour, and the legs reddish-brown. On crushing one of the Mites containing eggs, one or two young ones escaped from the almost mature ova; these had only six legs, one of the hind pair being missing. The males, which were few in number compared with the females, were very peculiar in appearance; their bodies were less in size, flatter, and the legs longer and stouter in proportion than those of the females; the posterior pair not used

for walking, but stretched out backwards, their extreme ends bent inwards, and, as far as I could make out, not furnished with claws. Their gait was extremely awkward. In certain *Dermaleichi*, found on small birds, the males have one of the hind pairs of legs very largely and peculiarly developed, but in their case it is the third, the fourth pair being very small, and used in walking.

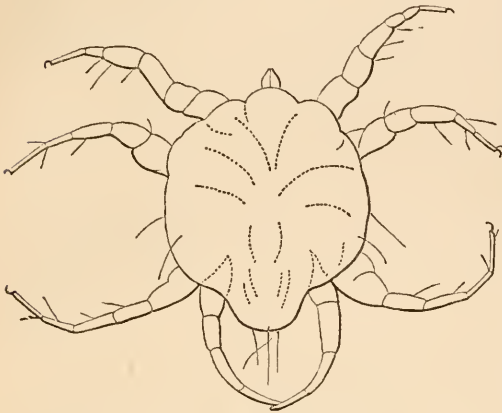


Fig. 21. Male of White Mite.

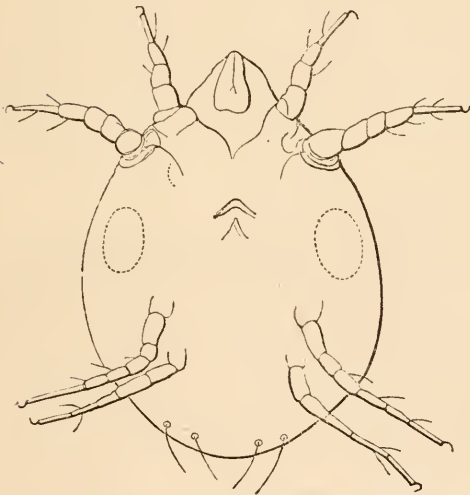


Fig. 22. Female of White Mite.

About the middle of August I again visited this tree, and found upon and with the White Mites a number of *Hypopi*, but whether these were parasitic on the White Mites, or merely residing with them, I was not able to determine. I passed this tree on several occasions during the summer, and frequently saw Wasps and Red Admiral Butterflies enjoying the sap, which kept some parts of the tree continually moist. The figures are all drawn from mounted specimens under a $\frac{3}{8}$ " object-glass,

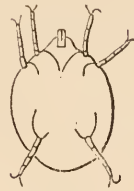


Fig. 23. Young of White Mite.

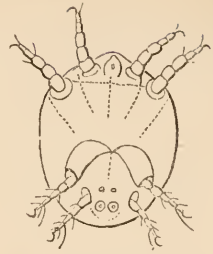


Fig. 24. *Hypopus* found with White Mites.

with A eyepiece, and are magnified about 72 diameters.

Kirton Lindsey.

C. F. GEORGE.

THE HISTORY OF OUR SALAD HERBS.

PART III.—MUSTARD.

MUSTARD was, according to the belief of the ancients, first introduced from Egypt, that country which claims the honour of being the birth-place of Ceres, the goddess of seeds, and Æsculapius, the god of medicine, through whose means this plant was made known to mankind as an agreeable and wholesome herb in its green state; while the seed was used as a medicine, and occupied the first rank among alimentary substances which exercised a prompt influence on the brain. Mustard is mentioned by Pythagoras, and was employed in medicine by Hippocrates, B.C. 480. Pliny states that there were three kinds of mustard cultivated in his day; the first of a thin and slender form, the second with a leaf like that of the rape, and the third with that like the rocket. The best seed, he says, was imported from Egypt, but that this plant grew in Italy without sowing. The Romans made great use of the seed in medicine; the oil extracted from it, mixed with olive oil, was used by those who suffered with stiffness of their limbs after a cold bath. Pounded with vinegar it was employed as a liniment for the sting of serpents and scorpions, and a dose of it effectually neutralized the poisonous properties of fungi. The Romans, and other nations after them, used to ferment mustard-seed in new wine, which converted it into a kind of inferior brandy, and was known by the name of *Mustum ardens*, burning wine.

The mustard-seed mentioned in the Scripture has of late years been a matter of considerable controversy, some authors supposing it to be quite a different plant from the one we are now treating of; but it is generally believed by the best authorities in the present day that the plant referred to was *Sinapis nigra*, the common mustard, which is indigenous to Palestine, as it is to Britain. Dr. Thompson, in his "Land and the Book," records that he has seen this plant as tall as the horse and his rider in the rich plains of Acre.

"As small as a grain of mustard-seed," appears to have been a proverbial expression for any small object among the Jews; and this seed, which was the smallest the husbandman was accustomed to sow, produced the largest results by becoming the greatest of the husbandman's herbs.

We have no record when mustard was first used in this country, but in the household accounts of the thirteenth and fourteenth centuries we find that mustard was known to our forefathers under the name of "Senapum," and appears to have been used in large quantities, for in that interesting Household Book of the Earl of Northumberland, in the reign of Henry VII., it is stated that 160 gallons of mustard-seed was the allowance per annum to his servants and retainers. In those days the seed was not manufactured, but brought to table whole, when it was bruised and mixed with vinegar, according to the taste of the eater. It was not only used as a condiment, but also, no doubt, for medicinal purposes. Tusser, who wrote his "Five Hundred Points of Good Husbandry" in the reign of Queen Mary, says, in the direction for February,—

"Where banks be amended or newly upcast,
Sow mustard-seed after a shower be past."

From this it appears that mustard was cultivated as a field crop; we also find it mentioned as an agricultural produce in Rogers's "History of Agriculture and Prices in England," as far back as 1285. It must then have been *S. nigra*, black-mustard, or *S. arvensis*, the charlock, for Gerard tells us that the garden mustard, which produces the whitest of seeds, had not become common in the days of Queen Elizabeth, but that he had distributed the seed into different parts of England to make it known. He says, "Mustard makes an excellent sauce, good to be eaten with gross meats, either fish or flesh, because it promotes digestion and sharpens the appetite." Thomas Cogan, M.D., of Manchester, who published his "Haven of Health" in 1605, says, "The force of the seed is well perceived by eating mustard, for if it is good in making to weep we are straightway taken by the nose and provoked to sneeze, which plainly declareth that it soon pierceth the brain. Wherefore as it is a good sauce and procureth appetite, so it is profitable for the pulse, and for such students as be heavy-headed and drowsy, as if they would fall asleep with meat in their mouths. And if any be given to music, and would fain have clear voices, let them take mustard-seed in powder, work the same with honey into little balls, of which they must swallow one or two down every morning fasting, and in a short time they shall have very clear voices." Shakspeare mentions mustard as a condiment in his play, "Taming the Shrew," act vi., scene iii., where *Grumio* says to *Katharina*, "What say you to a piece of beef and mustard?" It is also mentioned in his play "As you like it," in connection with pancakes (see scene iii.). In Evelyn's time, Tewkesbury was famous for its mustard. The seed,

Coles tells us, in 1657, used to be ground there and made up into balls, which were brought to London and other remote places as being the best the world affords. Mustard used formerly to be largely cultivated and manufactured in the county of Durham; but until the year 1720 the seed used to be pounded in a mortar and coarsely separated from the black integuments of the seeds, and in that rough state prepared for use. About the year mentioned an old woman of the name of Clements, resident at Durham, conceived the idea of grinding the seed in a mill, and to pass the meal through the several processes which are resorted to in making flour from wheat. The secret she kept for many years to herself, and in the period of her exclusive possession of it supplied the principal parts of the kingdom, and in particular the metropolis with this article; and George I. stamped it with fashion by his approval. Mrs. Clements used to travel twice a year to London for orders, and was able to pick up a small fortune. From this woman's residence at Durham, it acquired the name of "Durham mustard" (*Mechanic's Magazine*, vol. iv., p. 87). The seeds of *Sinapis arvensis*, charlock, and *Raphanus raphanistrum*, the wild radish common in our corn-fields, are often sold and used as a substitute for mustard-seed. The seed of the black mustard, like that of the wild sort, and also of the wild radish, if sown below the depth of three or four inches, will remain in the ground for ages without germinating: hence when once introduced it is difficult to extirpate. Whenever they throw the earth out of their ditches in the Isle of Ely, the banks come up thick with mustard, and the seeds falling into the water and sinking to the bottom will remain embalmed in the mud for ages without vegetation (Loudon's "Encyclopædia of Agriculture").

Sinapis alba appears to be a native of the more southern countries of Europe and Western Asia. It is now cultivated not only as a garden herb, but is grown very largely as an agricultural crop, chiefly as food for sheep or to be ploughed in for manure in its green state. Mustard is extensively cultivated in the Fen lands of Lincolnshire and Cambridge, also in Essex and Kent. Its medicinal properties are well known; in its action it is an irritant, stimulant, emetic, and stomachic.

Some authors think *Sinapis* is derived from *sino* to hurt, and *opsis* the eyes, from the pungency of the plant causing the eyes to water; others from the Celtic *nup* (modern Gaelic *neup*) a turnip which belongs to this tribe. Our word "mustard" is derived from the French *mountarde*, but in early times it was, both here and on the Continent, *sauve* or *senevé*. Some authors assert that the etymology of this plant was changed from the following circumstance. In 1382 Philip the Bold, Duke of Burgundy, was marching against his rebellious subjects of Ghent, and the city of Dijon, which traded largely in *senevé*, supplied him with a thousand men-at-arms, for which service

the Duke granted that city many privileges, amongst others that of bearing his arms, with his motto "*Moult me tarde*" in old French (I long or wish ardently), which was carved on the principal gate of Dijon. By some accident the middle word was destroyed; the other two, *moult tarde*, caused many a smile at the expense of the citizens, and in derision the *senecé* in which they traded was called *mourtarde*, a name it has preserved ever since.

MICROSCOPY.

ACTINO-CYCLUS BERKLEYI.—I have some specimens of this diatom, with reference to which I shall be glad if one of your correspondents will give me a little information. I should like to know, in the first place, whose nomenclature *A. Berkley* is; and, secondly, whether it is synonymous with any of the species described in the fourth edition of Pritchard's "Infusoria"; if not, where are the specific characters to be found?—*C. F. S.*

RESEARCHES AMONG THE SPONGES.—In the last number of the "Annals and Magazine of Natural History" there appear several important articles on the structure of various kinds of sponges. W. Saville Kent commences with one on "Professor Ernest Haeckel's group of the *Physemaria*, and on the affinity of the Sponges." W. J. Sollas describes two new and remarkable species of *Cliona*. There is also a paper by C. Mereschkowsky, on *Wagnerella* a new genus of sponge allied to the *Physemaria* of Haeckel.

MOUNTING MARINE ALGÆ.—Mr. H. F. Atwood, of Chicago, gives the following account of his method of mounting algæ, in the November number of the "American Journal of Microscopy." Mr. Atwood advocates the use of salicylic acid, and says—"My process is as follows: by using sea-salt (which can be bought for a trifle at any first-class druggist's) and distilled or rain water, a good substitute for sea-water is obtained; into this I immerse the rough-dried specimens of algæ, and in an hour or two they have resumed their natural shape. Now, picking out and clipping off such pieces as are best adapted for mounting, I transfer them to a bowl of distilled water, and wash them clean, and from thence transfer them to a small saucer containing a saturated solution of salicylic acid. The shallow cell into which they now go is built up of shellac cement, made by dissolving bleached shellac in Cologne spirits. Cells made of this substance are ready for use twelve hours after being laid on to the slide. I pick up the specimen with forceps, put it on the slide, and fill up the cell with the salicylic acid. I now breathe on the covering glass, and put it in its place, and by the use of blotting-paper absorb the superfluous fluid. A thin coating of gold size com-

pletes the work for the time being; in a day or two I lay on more gold size, and afterwards white zinc cement or Brunswick black; the finish, of course, being a mere matter of fancy. In mounting a piece of algæ having *Isthmia* parasitic on it, it is almost impossible to fill these diatoms if balsam is used, whereas by the use of salicylic acid every valve will be filled. In some cases the medium I have used has robbed the algæ of its colour, but this occurs but rarely. I have a slide of *Pilota hypnoides* in full fruit, the beauty of which could never be brought out except by first immersing the specimen in the sea-water I have referred to. For the study of algæ, direct light should be used, but using dark field illumination is the best way."

THE QUEKETT MICROSCOPICAL CLUB.—The last number of the Journal of this well-known and useful club contains an address by the President, Mr. Henry Lee, F.L.S., and a paper by Mr. W. K. Bridgman, on "The Ordinary Condenser Improved, or 'Circular' Illumination Superseded."

COLOURED OYSTERS.—The oysters of the celebrated Arcachon beds having last summer acquired a peculiar violet colour, the cause has been inquired into by M. Desconst, who finds it was due to the exceeding abundance of the highly-coloured spores of a sea-weed (*Rhytiphlea tinctoria*). The colouring matter of these spores had been assimilated by the oysters, and retained by them, the extreme drought of the summer months having favoured the operation by reducing the water until it was not sufficient to dissolve the colouring matter.

THE SPORE-PRODUCING POWER OF FUNGI.—At a recent meeting of the Linnean Society, Mr. Worthington Smith exhibited drawings of *Boletus subtomentosus*, and stated that in a specimen five inches in diameter, there are 17,000 pores, or tubes. Each pore when cut across shows 2,000 cells on the surface. The number of surface-cells on the under side of a specimen is 36,000,000. The cells in an entire plant are calculated at 615,000,000,000; and the number of spores produced by the same specimen are 5,000,000,000.

PARASITIC ALGÆ.—Professor Percival Wright has described a new species of *Chytridiaceæ* under the name of *Rhizophyidium Dicksonii*. It was found parasitic in the cells of a sea-weed (*Ectocarpus granulatus*), and it is believed that the so-called "utricular" fruits of Harvey, and the "spores" of Kützing, are, in the *Ectocarpus* at least, in reality parasitic *Chytridia*.

CARNIVOROUS SLUG.—No doubt the slug which your correspondent in the November number (p. 260) saw feeding on a worm was *Testacella Maugei*, of which a full and interesting description is given on page 89 of SCIENCE-GOSSIP for April, 1867.—*W. R. Tate.*

ZOOLOGY.

THE POPULAR SCIENCE REVIEW commences the new year well. Besides a capital summary of scientific progress, and many well-written and very fair reviews, there are articles as follow:—"On some Armour-plated Fishes," by H. Woodward, F.R.S.; "The Old and the New Chemistry," by M. M. Pattison Muir, F.R.S.E.; "The Geological Antiquity of Flowers," by J. E. Taylor, F.G.S.; "Cloud Outlines," by Rev. S. Barber, F.M.S.; "The Extinct British Wolf," by J. E. Harting, F.L.S., &c.

NEW AUSTRALIAN MARSUPIAL.—Professor Owen has recently described a new marsupial animal from Australia, under the name of *Pleopus nudicaudatus*. It is a small creature, allied to the Kangaroo-rats, but distinguished by having the type number of mammalian toes (five) on each of the hind feet.

THE FURNITURE BEETLE.—F. Hughes cannot do better than rub the furniture affected by this pest with carbolic acid, and let the latter soak into the wood. He will see no more of the beetles after this treatment.—*A. Smith.*

GLYCIIPHAGUS PALMIFER.—I was staying for a few days at Christmas in a country house at Austrey, in Warwickshire, and one wet morning it struck me that I would brush the wall of the beer-cellar, and have a microscopical examination of the result. I was rewarded by finding a considerable number of the extraordinary mite *Glyciphagus palmifer*.—At the time of the publication of Mr. Murray's late work on the Aptera (where this insect is figured) this remarkable species does not appear to have been known as an inhabitant of this country, although Mr. Murray anticipates that it may be one. Possibly, therefore, this may be the first instance of its capture here.—*Albert D. Michael.*

THE BEAKED WHALE.—In the last number of the *Zoologist* there is a capital description by Mr. Henry Lee, F.L.S., of the Beaked Whale, *Hyperoodon rostratus*, killed last September in the Menai Straits, and afterwards publicly exhibited at Bangor. This species is one of the Ziphioid Whales, an intermediate group between the Cachelots and the Porpoises and Dolphins; and it is characterised by having its teeth reduced to a single rudimentary pair at the tip of the lower jaw.

MIMICRY IN INSECTS.—At a recent meeting of the Entomological Society of London, Prof. Westwood gave an account of a remarkable Mantis (*Gonylus gonegylodes*) which mimics a flower, the deception being supposed to attract the insects upon which the Mantis feeds, to their destruction.

NOTES ON RARE LEPIDOPTERA, &c. — Referring to Mr. Molony's note in October SCIENCE-GOSSIP,

on the occurrence of *C. Celerio* on Aug. 29, Mr. Stainton, in the "Manual," gives October as the month for the perfect insect to appear, and Mr. Molony is, therefore, right in his statement of its being early in its appearance. It is a curious fact that though *Colias Edusa* has positively swarmed on the S. E. coast this summer, very few rare *Helice* have been taken, and its congener *Hyale* has not been seen there, but has occurred quite inland. Mr. S. Machin took (last August) a very fine specimen of *C. Hyale* in a wood near Henley, Oxfordshire. Last year I find among my specimens of Heterocera a fine one of *Acronycta tridens*, taken in Hillgrove-road, Avenue-road, N.W. The occurrence of this species near London, I believe, is unusual. September 13th, two specimens of *Edusa* seen in a street leading to the Hampstead-road (viz., Frederick-street), and I last saw it in Regent's Park, on September 15th. Since then it seems to have disappeared. It will be interesting to note if it appears again this year on any fine, mild day.—*R. T. Gibbons.*

PLANTS FOR REPTILE VIVARIA.—Probably the only plants which would succeed in a Reptile case are succulents, such as *Sedums* and small *Sempervivums*. These, I know, will flourish; but my slight experience tells me that it is better to consider plants as entirely secondary objects in a vivarium of any kind, and in Reptile cases to do without them altogether. I experience but little difficulty in the winter with respect to food. Mealworms can be obtained from the miller's, and kept in barley-meal as long as one pleases; common earth-worms are also useful; while, in order to secure flies during the winter months, I place fly-blown meat in a tightly-closed box, having bran at the bottom two or three inches deep. I place the box in an outhouse, and supply fresh meat twice a week, till the worms become chrysalides or gentles. Then I remove the box to the coldest part of the house, till flies are required, which I can obtain by taking a few of the gentles to a warm room for a day or two, so as to hasten the hatching process. Sometimes, however, the flies will hatch out, in spite of all precautions, in which case I keep the flies in the same box, and feed them with fruit and sugar and water.—*W. T. H. C. Tromc.*

BADLY-BLOWN EGGS AND PRESERVING ANIMALS.—I should recommend "G. T. B." to try a solution of carbonate of soda for dissolving out the hardened contents of his egg-shells. He must take care to wash the inside of the egg well with clean water after using the carbonate of soda, and to prevent its coming in contact with the outside of the shell. "W. G." will find a chapter by Mr. Waterton on preserving insects for the cabinet, in the 1839 edition of his "Essays on Natural History," p. 72. Mr. Waterton also gives instructions for preserving birds' eggs, p. 65, but I should not recommend their adoption. In a chapter at the end of his celebrated

"Wanderings in South America" (1825 edition), Mr. Waterton fully explains his mode of preserving birds; the process is very tedious, but the result, as I can testify, is very beautiful. Both this process and that of preparing insects would be too long to give an account of here.—*T. S.*

PRESERVING ANIMALS.—The basis of Waterton's proceedings was the preservation of his specimens by the use of bichloride of mercury dissolved in alcohol. This hardens the skins and causes them to retain the shape in which they are placed when wet for any length of time: thus no *wines* are necessary. "W. G." will find the whole process most minutely described in "Waterton's Essays on Natural History," *new edition*, F. Warne & Co., price 7s. 6d.—*W. B. R.*

PRESERVING ANIMALS.—The late Mr. Waterton had a peculiar mode of his own of preserving animals, an account of which will be found in his life by Mr. Hobson. It is not, however, by any means, equal to the present mode by a skilful artist of setting up birds. If "W. G." wants a ready way, let him eviscerate a bird, place it in the position he wants, and then fill it with cotton soaked in carbolic acid dilute; and the bird will be preserved for ages. This does not do, however, and is given up for the skinning process.—*C. R. Bree, M.D.*

LATER APPEARANCE OF THE HIRUNDINIDÆ.—"R." will be interested to hear that I have in my possession the nest and one egg of *Hirundo rustice* (*Chimney swallow*), which was taken while the bird was sitting; she having been duly watched when building in a cart-shed at Walton-on-the-Naze, in December, 1866. See *Field*, January 12th, 1867.—*C. R. Bree, M.D.*

BADLY-BLOWN EGGS.—Let "G. T. B." get Prof. Newton's little Essay upon blowing and preserving birds' eggs, which he can buy for a shilling or so, and he will get all the information he wants.—*C. R. Bree, M.D.*

THE "MIDLAND NATURALIST."—It is with much pleasure we welcome this new literary labourer into the field of popular science. Like the *Scottish Naturalist* (which relates chiefly to the Natural History of Scotland) and *The Naturalist* (the organ of the West Riding Natural History Societies), the *Midland Naturalist* purposes to give preference to local scientific information, and to chronicle the doings of the numerous energetic clubs and societies which are springing up in central England. Among these are the following:—Various societies in Birmingham, Burton, Caradoc, Dudley, Derbyshire, Leicester, Northampton, Nottingham, Rugby, Oswestry, Severn Valley, Shropshire, Stroud, Tamworth, &c. The first number of the *Midland Naturalist* appeared on January 1st, and appears with an attractively got-up cover designed by Worthington Smith. It contains well-written articles on Ferns, Meteorology, Zoology, and Geology.

BOTANY.

FURTHER NOTES ON THE FLORA NEAR CADER IDRIS.—Seeing from the "Botanical Notes in the Neighbourhood of Cader Idris," and also from another correspondent in the September number, that there are some of your readers interested in the plants of that neighbourhood, I should like to mention a few more to be found there, in addition to those already specified:—*Saxifraga stellaris*; *Melittis Melissophyllum* (bastard balm); *Impatiens noli-metangere* (yellow balsam); *Ranunculus Lingua* (great spearwort); *Sedum telephium*; *Enonymus europæus* (spindle tree); *Asperula odorata* (woodruff); *Ruscus aculeatus* (butcher's broom); *Narthecium ossifragum* (bog asphodel); *Myrica Gale* (bog myrtle); *Lobelia Dortmannua*, found in Llynn Creigenau, and also in Llynn Cyri, another lovely little tarn not far off, nestling close in under the mountain. Nearer to the sea I found *Eryngium maritimum* (sea holly); *Aster Tripolium* (Michaelmas daisy); *Statice Limonium* (sea lavender); *Criothum maritimum* (samphire); *Silene maritima* (sea campion); *Rosa spinosissima* (burnet-leaved rose); *Tanacetum vulgare* (tansy), found at Llangrwyll, a village four miles south of Arthog. *Asplenium maritimum* grows on the cliffs between these two places; and to the list of Ferns I can also add, having found *Asplenium viride* and *Hymenophyllum tunbridgense* on the Llynn y Gader side of Cader Idris. These plants were found in the month of August, during a week's stay at Arthog, a village on the Dolgelly side of the estuary, nearly opposite to Barmouth; and the district through which they range is included in walks the farthest point of which reaches Llynn Gader in one direction, and in another stretching along the coast three or four miles south of Arthog.—*A. Warner.*

THE WATFORD NATURAL HISTORY SOCIETY.—The eighth part of the "Transactions" of this vigorous society contains a capital paper by the Rev. George Henslow, F.L.S., on "The Fertilization of Plants," and another on "Instructions for taking Meteorological Observations," by William Marriott, F.M.S.

THE INFLUENCE OF TREES ON RAINFALL.—From observations by M. Faurat, relative to the comparative influence of leafy woods and resinous woods on rain and the hygrometric state of the air, recently communicated to the Paris Academy, it appears that pine forests have a much greater influence on the hygrometric state than others; so that if the vapours dissolved in the air were apparent, like fogs, we should see forests shrouded in a large screen of moisture, and in the case of resinous woods the vapoury envelope would be more distinct than in that of leafy woods. M. Faurat also shows that pines retain in their branches more than half of the water which is poured upon them, whereas leafy trees allow

fifty-eight per cent. of the precipitated water to reach the surface of the ground. He suggests, therefore, that in planting with a view to oppose inundations, it would be advisable to choose by preference resinous trees, as offering a better covert.

GENTIANA ACAULIS IN WALES.—As one of the correspondents who felt doubtful as to the occurrence of *Gentiana acaulis* on the Cader, may I be allowed to say the doubt has not been removed? My personal authority about the Cader is of little use, since when, as a boy, I ascended it I was more fond of Lepidoptera than flowers, but I have a distinct impression of seeing a *Gentiana* there, but neither *acaulis* nor *amarilla*, but *campestris*. I see this latter is included for Merioneth in "Topographical Botany," though Mr. Ley does not mention it in his list; but as this list is principally of such plants as are not mentioned in "Topographical Botany," it does not follow that he failed to observe it. The habitat of *campestris*, as given in Hooker's "Student's Flora," is moist, especially hilly pastures, ascending to 2,400 feet in the Highlands. I have gathered it on Ben Lawers at 1,800 feet, where it is not at all uncommon on sub-Alpine slopes, and though *campestris* is very unlike *acaulis*, yet I would respectfully suggest if this might not be the gentian that was noticed;* anyhow the discussion will probably lead to a more thorough search of the Cader shortly by some of your readers.—*G. C. Druce.*

WORMS IN FLOWER-POTS.—These can always be got rid of by watering the plants with a solution to which a tenth part of grated horse-chestnut has been added.

WILD CHERRY-TREE (*Prunus avium*).—As some notice has lately been taken of the size of this tree, I beg to report one as at present existing within a field of my farm, which presents the following proportions:—

2 feet from the ground, 21 feet circumference.

3 " " 15 " "

6 " " 21 " "

10 " " 19'6 " "

12 feet up to the bifurcation of the branches.

This grand tree was first shown me by my friend Mr. E. Lees, when it was in fruit. Since then the hurricane of the 14th October has swept away its principal arm. I figured it on the 5th of November of the present year.—*J. B., Bradford Abbas.*

BRITISH MARINE ALGÆ.—A correspondent of mine, resident in St. Helier's, Channel Islands, writes me that a short time since, a considerable number of the singular sea-weed *Gigartina Teauii*, had there been washed ashore, some of the specimens very fine, and a few of them fertile; this plant has not been discovered on any of the British shores for

upwards of fifty years. I have received a few of these specimens also from the French coast, and believe it to be tolerably abundant on the coast of Normandy, and southwards along the west shores. I last year visited Weymouth, and there on the sands picked up a few very interesting specimens of *Gigartina pistillata* in fruit, and also found two or three fronds in very bold form of *Gracolaria compressa*. From that town I proceeded to Bournemouth, and was there fortunate in discovering two specimens of *Dasya pumicea*, which appears to have been absent from our waters for some years. The shore of Torpoint, Plymouth, is very celebrated for receiving from its adjacent waters many very beautiful seaweeds; amongst its number I last year found in some abundance the very pretty weed *Nitiphylum Thyssanorhizans*, some of the specimens in fruit. I also found it in the same locality in the year 1873, and in fruit, and the somewhat scarce plant *Dudrisina dudrisnagra* also came before me on the same shore.—*H. G.*

ASPLENIUM SEPTENTRIONALE.—I can confirm what your correspondent, Mr. Belt, says as to *Asplenium Septentrionale* being found near Dolgelly; my friend Mr. Rose, of Gorton, and I saw it growing there in the summer of 1874 (but sparingly), and we did not even bring a frond away.—*T. Brittain.*

SOLANUM DULCAMARA.—My impression, after reading a great many articles about this plant, is that the bulk of evidence points to the berries as being innocuous, or nearly so. In Pereira "Materia Medica" (edited by Bentley and Redwood), the following account of the properties of this plant is given:—"Physiological Effects, not very obvious. It is reputed to operate as a diaphoretic, diuretic, and demulcent, and in overdoses as an acro-narcotic; but many have given the fruit and preparations of the young branches in very large doses, without any obvious effects." The dried young branches are used in medicine, and used very seldom in comparison with other medicines. I can practically say that it is very rarely prescribed in this neighbourhood, and why? Because of its unobserved effects. The following is an extract from Bentley's "Botany":—"A fatal case of poisoning by the berries has occurred at Toulouse." Why do we not hear more of their toxicological effects, when so many of our damp hedges are so profusely adorned with their tempting berries?—*William West, Bradford.*

GEOLOGY.

GEOLOGY OF COLORADO AND THE ADJACENT TERRITORIES.—We have received a copy of the ninth annual report of the United States Geological and Geographical Survey of the above country, in

* I see the authority upon which *acaulis* figured in Smith's Botany is that of Mons. de St. Amans, who found it near Haverford-west, where, without doubt, it was a garden escape.

which is contained a copious report of the progress of the exploration for the year 1875, written by Dr. F. V. Hayden. The volume is attractive, although bulky, and is copiously illustrated by maps and sections. A zoological appendix furnishes us with the new discoveries concerning the wild animals and insects of the districts surveyed; and this part is also abundantly illustrated with plates. The generosity of the United States Government in supplying foreign men of science with numerous copies of their scientific books is in strong contrast with the niggardliness with which our own Geological Survey publications are dribbled out.

THE SOLITAIRE.—In the *Annals and Magazine of Natural History*, Prof. Owen gives a lengthy description of this extinct bird, based on the remains brought home from the island of Rodriguez during the Venus Transit expedition. The Solitaire (*Pezophaps solitaria*, Strkl.) was a huge ground-dove, about three feet long, whose wings gradually became aborted until it could no longer fly. The absence of any extirpating enemies (until man appeared), and the presence of abundant food, enabled the Solitaire to acquire its great size.

THE GEOLOGISTS' ASSOCIATION.—Besides some well-written and profitable descriptions of several visits made by the members of this association to the Crag districts of Suffolk; Grays, Essex; Leicestershire; to Caterham, Godstone, Tilburstow, Nutfield, Hampstead, Guildford, and Derbyshire, the last two parts of their "Proceedings" contain papers by the Rev. J. F. Blake, on "The Restoration of Extinct Animals"; "On the Geology of Leicestershire," by W. J. Harrison, F.G.S.; "On the Flints of the Chalk of Yorkshire," by J. H. Mortimer, F.G.S.; on "The Forms of the Genus *Micraster*," by C. Evans, F.G.S.; the "Geology of the Eastern portion of the Banbury and Cheltenham Direct Railway," by T. Beesley, F.C.S., &c.

"FUR-BEARING ANIMALS" is the title of a monograph by Dr. Elliott Coues on the North American *Mustelide*, and is published as one of the United States Geological Survey works. It gives a detailed account of the Wolverine, the Martens or Sables, Ermine, Minx, and various other kinds of Weasels; of several species of Skunks, of the Badger, Sea-otter, Land-otter, and allies of these animals. This compact and handy volume is illustrated with sixty figures on twenty plates. It is published by the Government Printing Office, Washington, U.S.

THE HUGE FOSSIL BIRD FROM SHEPPEY.—At a recent meeting of the Geological Society of London, Prof. Owen described some remains of a large bird obtained by Mr. W. H. Shrubsole from the London Clay of Sheppey, consisting of parts of fractured humeri belonging to the right and left sides of the same species, or perhaps individual, and including the

head of the bone, with portions of the upper and lower parts of the shaft. The texture of the shaft, the thinness of its bony wall, and the large size of the cavity, recall the characters of the wing-bones of the large Cretaceous Pterodactyles. The author indicated the characters which led him to regard the remains under consideration as those of a volant bird, most nearly approaching the genera *Pelecanus* and *Diomedea*; and as the evidence derived from the cranium of *Dasornis* would indicate a bird too large to be upborne by wings to which these bones might have belonged, whilst the skull of *Odontopteryx* is far too small to have formed part of a bird with wings as large as those of the Albatross,—and *Lithornis* and *Pelargornis* are excluded by the characters of their remains, the author concluded that the bones obtained by Mr. Shrubsole furnished indications of a new genus and species of flying birds, for which he proposed the name of *Argillornis longipennis*. He regarded it as probably a long-winged natatorial bird, most nearly related to *Diomedea*, but considerably exceeding the Albatross (*D. exulans*) in size.

GEOLOGICAL HISTORY OF THE DEER FAMILY.—At the same meeting Prof. Boyd Dawkins gave an outline of the history of Deer during the Miocene and Pliocene periods. He said the majority of known antlers could be referred to two types,—an earlier or *capreoline*, and a later or *axidine*. In the Middle Miocene period the cervine antler consisted of a simply forked crown. In the Upper Miocene it had become more complex. In the Pliocene it had become still more complex and complicated; and in this respect the development of antlers in time represented that in age of the same individual. The nearest living analogue of the Miocene Deer is, according to the antler, the Muntjak (*Styloceros*), now found only in the oriental region of Asia, along with the Tapir, which also coexisted with *Cervus dicranoceros* in the Miocene forests of Germany. The Pliocene Deer, again, are generally most nearly allied to the oriental Axis and Rusa Deer, the only exception being *Cervus cusanus*, the antlers of which resemble those of the Roe, an animal widely spread over Europe and Northern and Central Asia. The alliance of these Pliocene Deer with those now living in the Indian region is regarded by the author as a further proof of the warm climate of Europe in Miocene times, confirmatory of the conclusions arrived at by Saporta from the study of the vegetation.

THE FOSSIL FUNGUS.—In the December number of the SCIENCE-GOSSIP is a reprint of a paper on a fossil fungus, in which Mr. G. W. Smith is represented as the discoverer. My knowledge of this particular fungus induces me to dispute his claim to its discovery. In the first place, the section from which he has sketched the figures to illustrate his paper came from my own cabinet. In the second place, I read a short paper before the Scientific

Students' Association, Manchester, during the session of 1874-5, on this fungus, which was identified by one of the members of that society as *Peronosporites*. No record of this discovery was made at the time, except in the minutes of the Society. After reading the above paper, I put a section of this fungus (among other sections), in the hands of my friend, Mr. Young, for his own cabinet, and he casually showed it to Mr. Carruthers and Mr. Smith, which resulted in Mr. Smith's paper. This is one instance among many of the necessity of more permanent record being made in some leading journal of the work of our country societies.—*John Butterworth, Goats Shaw, Oldham.*

NOTES AND QUERIES.

BRITISH SNAKES.—Is there any evidence of our English snake feeding upon birds or field-mice, or, indeed, anything but frogs and toads? I have kept many snakes (*Natrix torquata*), and have only twice seen them consent to swallow toads, and that was during very hot weather, when their appetite was excited by the high temperature of a melon-frame, in which they were kept. Most snakes (I am now referring only to our native species) will prefer starving to death, according to my observation and that of many of my friends, to partaking of any other food than frogs, though it is said in many books that they will eat mice and birds.—*A. R.*

VENOMOUS REPTILES OF IRELAND.—Can any reader of SCIENCE-GOSSIP give me information respecting the venomous reptiles of Ireland? Having explored the counties of Dublin and Wicklow, I was much struck at never coming across any such reptile, although in so many spots where one would expect to find them—ruins, river-banks covered with thick undergrowth, and deeply-secluded dells. Can any reader inform me if this is the case throughout the isle, or how to account for the lack in these parts? Has climate or soil anything to do with it (casting aside, of course, the popular legend of St. Kevin having banished them to Glendalough)?—*S. E. Bennett, St. Hildred's.*

PERTINACITY OF THE HAWK.—On the 30th of September last I was staying with the family of Colonel C., and, while they were at church, a hawk flew into Mrs. C.'s bedroom, attracted by her bullfinch and her linnet, each sunning itself in a separate cage. How long the intruder kept these poor birds in agonizing terror no one can precisely state; the maid, who first entered the room, chased the enemy away, and informed her lady of the unwelcome visitor. Mrs. C. rushed up-stairs to the cages of her pets, and found them both greatly disturbed: they approached her, and with eloquent eyes and various expressive gestures, made her understand how terribly they had been frightened by the appearance of a bird of prey. Nothing could prove this to a greater certainty than the loss of their feathers, which lay scattered in their cages. The bullfinch dropped nine feathers from his tail, and the linnet seven. These feathers were carefully wrapped up in silver paper and put into a box, as a memento of that Sunday. The wretched culprit flew to an opposite tree, where he was watched by the stablemen, till they saw him fly again into the tempting room, evidently determined to make a good Sunday's meal

of the plump little birds, but there the villain met with his due. Somebody disturbed him, out he flew, and, clumsily, like a burglar who is caught in the fact, knocked himself against the window, blooded it all over, and disappeared, to be seen no more. The hawk could not have got to these birds, the wires were so close.—*E. A. W.*

QUERY AS TO WATERCRESS.—The plant referred to by Chateaubriand is the great water-radish (*Nasturtium amphibium*), a plant which increases rapidly by stolons. Sir James E. Smith ("English Flora," vol. iii. p. 195) writes: "This plant is noticed by the celebrated M. Chateaubriand in his account of England, for its wonderful powers of increase by the root. He observed it in the river near Beccles, where he long resided as an emigrant, and his rather florid description has excited wonder and curiosity in many who daily, perhaps, pass over, without regard, several no less interesting works of their Creator." I should doubt whether the peculiar method of progression described by M. Chateaubriand is the usual habit either of this or any other plant, and I have certainly never observed it myself, though I have long been familiar with this species of cress; nevertheless I have no doubt that M. Chateaubriand accurately related what he himself saw, as it is exactly what might very easily occur if the bottom were disturbed by an oar or punt-pole.—*F. V. P.*

CAVES IN SOMERSETSHIRE.—Can any readers of SCIENCE-GOSSIP give me any information as to the caves of Somersetshire, especially those of the Mendip range, in Barrington Combe? On an elevated spot, known as Dolbury Camp, there is a curious inclosure of fallen stones and earthworks, in the centre of which is a deep pit, of such a depth that one cannot from the mouth see the bottom. Can this have been a well for the garrison, or an artificial shaft for mining, or even a natural cave? Any information on this subject will be gratefully received, as I have ineffectually tried to gather explanation for some time past.—*Somerseta.*

A FELINE NURSE.—Calling at a farm-house the other day, I was told I was just a day too late to see a very wonderful sight—a cat nursing some little chicks. It appears the cat had a family of dead kittens a few days before, and the same morning some five or six chicks were hatched; as there were others to come out, the lady of the house took the just hatched chicks into the house till all were hatched, and placed them before the fire in the sitting-room, or, as we say here, the "keeping room." Pussy, greatly to the horror of the good lady of the house, took a great fancy to them, and could not be kept away from them. Wishing to see what would take place, the owner allowed her to come near, when she began to stroke them down with her paw in the most affectionate and tender manner, and, after a while, lying down, gathered them well under her. There she lay all the day; in the evening they were taken from her, but next day she did the same; but the third day, fearful of accidents, they were taken away from her and put under their proper mother, who had now hatched out her whole brood. I wonder what pussy would have done with them.—*Gobbs.*

ENTOMOLOGICAL AND BOTANICAL LOCALITIES.—Can any of your correspondents tell me exactly where the following places in Berks and Oxon are:—Shotover Hill, Winchwood Forest, Cowley, Cornbury Quarry, Sunninghill Wells, and Bagley Wood? I have seen it mentioned that various

insects and plants are to be found in these localities, and shall be obliged to any one who will give me the required information.—*H. Morton.*

NESTING OF MISSEL THRUSH.—Can any reader of SCIENCE-GOSSIP tell me whether it is rare or not for the Missel Thrush (*Turdus viscivorus*) to build its nest on the tops of walls? I found a nest in May, 1872, on the top of a wall,—it had four eggs in it, and the female was sitting on it; and another in May, 1876.—*Jas. Engleby.*

BLACKBIRD AND THRUSH.—About the middle of April, hunting round the garden, I found a nest nearly finished, which I thought belonged to a blackbird, though I could not catch sight of the female bird. Two days after, looking into the nest, I found four eggs, all just like a blackbird's, except that one egg had the deep claret markings of a thrush: the female being still very wary, had flown away before I could see her. Two or three days after I again visited the nest, and found that the bird sitting was a thrush; she was then very tame, and, showing no signs of fear, let me watch her, standing within a few feet of her nest. The last week in April the eggs were hatched. I was unable to watch her again for about ten days, when, to my regret, I found that only one young bird remained; the old bird was then very restless, flying round and round her nest, but never going more than ten yards from it, and uttering incessantly a single low plaintive note. I had then ample opportunity of watching her, and can state with certainty that it was a song-thrush (*Turdus musicus*). As soon as the young bird could fly at all, both the mother and her offspring disappeared. The blackbird was not nearly so assiduous in the welfare of the young one as its mate, and I cannot see why it should mate with a thrush when there are plenty of blackbirds all round us.—*G. T. B.*

BLACKBIRD OR THRUSH.—In the November number of SCIENCE-GOSSIP I saw a notice, by "G. T. B.," of Blackbird and Thrush. I have taken, at several places, nests built like a blackbird's, but at the top of a high fir generally (while blackbirds build near the ground), containing eggs like a thrush's, but instead of black spots, a few pale reddish ones. The nests were lined with hay, not mud, as a thrush's, surrounded outside with coarse pieces of stick and bits of fir or grass. I have never seen the old birds, but I have named them in my cabinet as produced by the mating of a blackbird and thrush.—*S. S. B., Bradford Abbas.*

BIRDS' EGGS.—In your number for September last a correspondent gives a few reasons for "birdnesting," which I think are open to the following objections. To take them in order:—1. Is it necessary that, to obtain a knowledge of the situation and materials of a bird's nest, the eggs need be taken? Would not a note, made on the spot, of the nest, its contents, position, &c., without disturbing the eggs, be more to the point? 2. With respect to the many people who take their only knowledge of ornithology from the robbing of nests, I may venture to assert that, as far as my knowledge goes, three out of four such collectors take little or no interest in the birds themselves; in some cases not even in the nest, the eggs being all they look or care for. And of how much value to science is the knowledge they thus acquire? 3. There is certainly a great difference between taking the eggs of domestic poultry and those of wild birds, for in the former, domestication seems to have almost eradicated their natural feelings (though even in them there is some trace left, as is shown by their some-

times concealing their eggs as much as possible, laying in out-of-the-way holes and corners), but that pain is thus given to wild birds, there can be no doubt, after one has heard the painful twitter of the parent-bird whose nest is disturbed. 4. That the taking of their eggs is necessary to keep the commoner species within bounds, I fail to see. In the first place, if there were any fear of their becoming too numerous, why should an Act of Parliament have been passed to check this "practice"? On the other hand, is there not a fear of causing the rarer species to become extinct, for it is on them that the brunt of this "practice" falls? How many are there, even of those who call themselves collectors, or oologists, who only take what rare eggs they really require for their own cabinets? How many resist the temptation to take all the very rare ones they find, when they are so easily exchanged, or when a friend would be so pleased to accept them? Of course there are some who do, but I am afraid they are sadly outnumbered by those who do not, as reference to your Exchange column any month will show. But those of the commoner kinds are neither saleable nor exchangeable, and therefore remain comparatively unmolested, except by the veritable nest-robber; and the rarer a bird becomes, the more are its eggs sought after. Another of your correspondents reminds Mr. Van Dyck that there is a law which prevents the shooting of many birds during the time of their stay with us. May I be allowed to remind *him* that there is also another, to prevent the robbing of their nests? As to the "fond remembrances of bygone days" on which he lays such stress, could not they be brought to the mind just as vividly by looking through the note-book, the companion of such rambles (he accuses Mr. Van Dyck of a crib: may I ask him if he has not read the paper on "Birds' Eggs" in "Notes On Collecting and Preserving Natural History Objects"?), and would not the pleasure of searching out the nest be rather heightened than otherwise by leaving the eggs; for he is hard-hearted indeed in whom the plaintive notes of the mother-bird raise no touch of feeling akin to remorse? Then we are told that after a "few years" earnest collecting (it would be interesting to know how many eggs are usually destroyed in a few such years) most "collectors" are able to give "not only the name of the bird," but an account of its habits, &c., with a "number of interesting facts"; but, as before mentioned, I fail to see that it is at all necessary to rob the nest of its eggs to obtain a knowledge of these "interesting facts," and if it were, to use a French expression, is "the game worth the candle"? In short, I do not see that in ninety cases out of a hundred any object is gained by breaking the laws of the land in this particular, and cordially agree with the Editor in wishing that all Natural History societies would follow the good example set by the Woolhope Club.—*L. W. G.*

SINGULAR AFFECTION OF A HEN.—We had a hen, of the barndoor or common fowl breed, say about two years old, which we purchased, with another from the same brood, from a farmer in this neighbourhood some months ago. It was observed that the hen's eyesight was dim when we first had her, but after a few weeks the sight seemed to leave her altogether, and of course total blindness followed. The fowl was fed by placing her food immediately under or close to her, and she picked up sufficient to sustain life. The other fowls seemed to take exception at the blind hen's company, and each one, with one exception, constantly attacked her. The curious part of the thing was, that the sister of the blind

hen (previously mentioned) had chickens, and as soon as she returned at night with her young brood (four), the blind hen was called by the sister, and shared the protection with the little chicks, *i.e.* under the wing of their mother. This continued for two or three weeks, or until some ten days ago, when a carrion crow, while making a predatory visit to the precincts of the farm, observed the helpless condition of our blind pet, and made an attack upon her, and before any assistance could be rendered, killed and devoured nearly the whole of the body. We, as you may imagine, were full of sorrow for our loss.—*P. Donaldson, Goytre, Monmouthshire.*

“FAIRY-FLAX.”—In the September number of SCIENCE-GOSSIP, No. 153, p. 194, Mr. Robert Holland speaks of the amazing undergrowth of fairy-flax. What plant is known under this name?—*E. L. R.*

PREDATORY SLUG.—This may have been *Testacella halioleida*, a species known to live on earthworms; but usually subterranean in its habits. It may easily be distinguished from the common slugs by the following characters: the body increases in size like that of a leech, from the head to the posterior end, which terminates abruptly; and bears a small external shell; it is very tough, and of a yellow-grey colour, with grooved lines along the side of the body. The common slugs, *Limax* and *Arion*, are, however, not only carnivorous, but cannibals. After slaughtering one of these garden pests, I have often found in the evening two or three more feasting on the body of their late comrade. Slugs and snails, as Mr. Slater remarks, seem to be unaffected by vegetable poisons; indeed, the poisonous *Solanaceæ*, as *Atropa Belladonna*, seem specially attractive to them. This, however, is less remarkable when we remember that the rabbit, an animal much higher in the scale of life than the snail, can eat any quantity of *Belladonna* with impunity.—*H. F. Parsons.*

IS THE LEMMING FOUND IN ENGLAND?—Is it not very likely that the holes referred to, under this heading in SCIENCE-GOSSIP, No. 152, p. 189, were made by the common Shrew (*Sorex araneus*, Bell), which it is well known makes large superficial burrows in the earth? The fact of its being on such high ground is probably accounted for by the increase of its great enemy, man, in the valleys below. The size of their burrows would be about an inch in diameter.—*S. T.*

FRUCTIFICATION OF SYCAMORE (No. 155, p. 257).—Mr. W. E. Green has, I think, scarcely appreciated my difficulty in accounting for the increased number of winged seeds in so many sycamore fruits. With us in the north, although sycamores, hollies, nuts, and some few other trees and shrubs have produced large quantities of fruit, it has decidedly been an unfruitful year. We have had no apples, pears, or plums, and very few cherries; no acorns, very few ash-keys, and scarcely any haws; therefore, I do not think the phenomenon can be accounted for by supposing that the season has been a particularly fruitful one, which really means that the weather was suitable, or the insects numerous enough during flower-time for the fertilization of *existing* germs, or sunny enough for the full and perfect development of fertilized germs. If sycamore flowers usually contained several pistils, one only, as in the Nut, coming to maturity, or even the rudiments of several pistils, one could readily understand that congenial weather might cause those already existing, though rudimentary organs, to be developed and to reach maturity; but this is not the case. The flower of the sycamore does not contain,

under ordinary circumstances, even the rudiments of several pistils. No doubt, as Mr. Green suggests, an unusually mild winter might cause great changes in the growth of plants, but the tendency of a mild winter is to produce rather a scanty crop, partly by the blossom opening too soon, and partly by the time of rest for the tree not being sufficiently prolonged; and I suspect the cause is more remote. The weather of the present year could hardly have caused the formation of new organs; the mildness of last winter may have had some peculiar effect, but it is perhaps more probable, if weather has had anything to do with it, that there was some specially congenial weather during the summer or autumn of 1876 which induced such a complete ripening of the wood that it caused the sycamore-trees to start with unusual vigour in the spring of this year, and that organs were thereby produced which, had the trees been somewhat less vigorous, would have been entirely suppressed.—*Robert Holland, Norton Hill, Runcorn.*

THE TYRIAN DYE.—Your correspondent “B.” (see No. 155, p. 260) is evidently unaware that this celebrated dye was of a *crimson* hue, or he would not have imagined that it might have been extracted from *Leptoclinium punctatum*, “because when put into water, it (*L. punctatum*) stained the water of a *blue* colour.” The word *purpureus*, whence the English *purple*, signifies “bright red,” as *Digitalis purpurea*, the Foxglove. The present corrupt use of the word purple to signify a shade of blue is quite recent. Has “B.” never read Izaak Walton’s lines on fishing, in which he mentions the common perch, with its “fins of Tyrian dye”?—*W. R. Tate, Blandford, Dorset.*

A CURIOSITY.—I have in my possession a Hindoo or Burmese sword-handle made from an elephant’s tusk, on which, after the Eastern fashion, many quaint and curious figures are carved: men with grotesque and hideous faces disfigured with elephants’ trunks, crocodiles’ mouths, monkeys’ heads, and the like. Among these forms, but separated from the rest, is carved a tiger or bear, I am not sure which, but think the latter: in its mouth it holds a fish. Now, I should very much like to ascertain if this has been carved among its fellow-anomalies as a prodigy that has been said to have existed, but which the executor, desiring to ridicule, placed among his monstrosities. South American travellers of good repute tell tales of the common jaguar (*Leopardus Onca*) hanging over the banks of streams, and catching the unwary fish that chance to pass by. Is it on record that any member of the Felidæ or Isabellæ of the old world ever performed the same feat?—*Dacart Aikone.*

SUDDEN CHANGE IN COLOUR OF THE HUMAN HAIR.—“Is it possible for a person’s hair to turn white in a short time?” There are so many instances now on record, that there ought to be no longer any doubt upon the subject. In the late Arctic expedition nearly every man’s hair became greyer, and in some cases white, but assumed its natural colour when the men returned to lower latitudes. In many cases the human hair is said to have turned grey from grief, extreme care, or sudden fright. My experience is very small, but nevertheless may be interesting to some of the readers of SCIENCE-GOSSIP. During an outward passage to Australia, the ship I was in suffered greatly in the British Channel; twice we were nearly wrecked, having lost three anchors and two cables. The pilot who had charge was constantly on watch, only snatching a few minutes’ sleep here and there, as opportunity afforded. On the whole, he had a very anxious time indeed, and when he eventually left the ship off the Isle of Wight he

certainly looked twenty years older. I thought his hair had decidedly turned greyer: this may, however, have been only imagination, and therefore ought rather to be considered as an impression than actual fact. Within the last few months a fresh case of the possibility of the colour of hair changing has come under my notice. An old gentleman, aged eighty-nine, residing in my immediate neighbourhood, lately died. For many years his hair had been perfectly white, but a few days before his death some of his hair became black, giving the appearance of his having dark brown or black hair. Here it is interesting to note that in his younger days his hair was light. After the death of this gentleman the tips of the hair for about an inch assumed the original colour, becoming white again. Has a similar case fallen under the notice of any of your readers? I have heard of another instance, where after death the hair turned from white to black. Dogs seem to be affected with regard to their hair in like manner as human beings. I lately read of a case where a black Newfoundland dog became grey in a few weeks; and the writer declares that the only cause for this sudden change was grief.—*C. P. Ogilvie.*

MISTLETOE, APPLE, AND PEAR.—Does not the fact mentioned by Mr. C. H. Westley, that mistletoe does not grow commonly, if at all, on the pear, open up some interesting questions? I believe I am correct in saying that, though the apple and the pear can each of them be grafted on a variety of stocks, amongst others on some but remotely related to them, neither can be grafted on the other. The growth of the mistletoe is a kind of natural grafting, and occurs on trees belonging to several widely different orders; yet it seems to be confined to one of these two allied species. May there not be some underlying physiological identity between the various possible stocks, some physiological difference between apple and pear? Has any one ever attempted to graft apple or socies ther on mistletoe? Will mistletoe grow on all stocks used for apples, or on any used for pears?—*G. S. Boulger.*

MISTLETOE.—Bentley mentions *Viscum album* as parasitic on thorns and willows? Can your readers tell me whether it is commonly found on these? also whether *Prunus spinosa* is the plant meant by thorns?—*J. J. W. S.*

WATERCRESSSES.—The following extract may perhaps be of interest to some of your readers. At the meeting of the Royal Horticultural Society on Tuesday, Mr. Shirley Hibberd, of Stoke Newington, presented a dozen pans of watercresses, grown in the manner he has practised for some years past. One of the advantages of this system is, that the plants are under complete control to be placed in the sun or the shade, or during winter in heated plant-houses, and can at all times be supplied with pure water, and thus be preserved from contamination by the pollutions common to rivers, and even to watercress-beds. The pans in which they are grown measure from 15 inches to 20 inches across, and from 6 inches to 9 inches deep. They are filled with rich loamy soil, intermixed with lumps of chalk or old mortar, and then very small cuttings are inserted. These soon become strong plants, and in from fifteen to twenty days may be gathered from, the cresses being tender and delicate in flavour, and of the most beautiful appearance. The twelve plants shown have been regularly cut for the table for a period of six weeks, and their fresh and robust appearance indicated that gatherings might be had from them for another six weeks without their being exhausted. The sorts shown

were the Erfurt sweet green cress, the Springhead brown cress, and the Stoke Newington purple cress. The adjudicators signified their approval of this mode of cultivation by the award of a medal to Mr. Hibberd.—*H. Budge.*

QUERY RESPECTING SEA ANEMONES.—Will a correspondent kindly give a little information respecting Sea Anemones: should they be fed, and if so, how often, and about in what quantity?—*W. T. H. C. Trombe.*

SWANS AND RATS.—Some time since I noticed some rats had taken possession of a hollow tree growing by the side of my mill dam, and not wishing to retain them there as tenants, I suggested to one of my servants the propriety of serving them with "notice to quit," and to this end I enlisted the services of a ferret. Very soon two or three of the family leaped into the water. A pair of swans were close by watching our movements, and no sooner did the rats attempt to swim across the dam, than the swans at once gave chase to the enemy; more than once they seized the rats and threw them above the water, and as often as they raised their heads, the swans, regardless of the presence of spectators, pursued their enemy to their bitter end, and by frequently pecking at them eventually succeeded in drowning them, as was proved by the dead bodies floating down to the mill ruck a few minutes after the battle.—*R. Cooke, Glanfort Mill, Norfolk.*

SPECTRAL PHENOMENA.—Two curious phenomena have lately come to my knowledge in conversation with friends who were eye-witnesses of them. Perhaps some of your readers may be interested enough to endeavour to throw some light upon them. A gentleman was parting with a friend on Hampstead Heath, one night about eight years ago, the moon and stars shining, when they both observed what appeared like *three bright bars* stretching across the sky about midway between the zenith and horizon towards the west, and apparently also twenty or thirty yards in length, and remaining so for over half an hour. A lady walking along the Euston road when the sun was shining brightly, saw in the air before her a *gigantic semaphore*. Upon reaching one of the stations of the Metropolitan Railway, a real semaphore was noticed to correspond in position with the spectre.—*R. H. A. B.*

THE LUNAR BOW.—I observed this remarkable phenomenon on November 22nd under very favourable circumstances. At about 8.25 P.M. the moon was shining very brightly, and on looking towards the western sky, I perceived a faintly-coloured bow spanning the heavens and extending some distance across the distant landscape. The colours were pale and indistinct, but the general form of the bow was very definitely marked.—*George Clinch, West Wickham, Kent.*

LAPWING AND SPARROW-HAWK.—I am not much surprised at the communication of J. C. Stephens, No. 155, p. 262, in which he states that he "observed a lapwing or peewit pursuing a sparrow-hawk." I believe that, under certain circumstances, that bird will attack, or at least chase and attempt to frighten, any bird whatever that approaches the ground where it has taken up its abode. As a proof of this I will mention what came under my own observation during the past spring. In a field of about twelve acres in extent adjoining my residence, two lapwings took up their abode. There are some rookeries at a short distance from this, and on several occasions the colonies came into this and the adjoining fields to

forage. For some time the lapwings paid little attention to the crows, but ultimately the female commenced to hatch her eggs, and then a real warfare began with the male. No sooner did the crows, generally two or three hundred, alight in the field where the female was sitting, than the male commenced a most determined attack on them. It darted towards them with the rapidity and vigour of a hawk, but evidently with the sole intention of banishing them from the field, as I could never notice that it came actually in contact with them, but always so near as to render them uncomfortable. Those who have observed a lapwing under these conditions will be aware of the peculiarly loud noise that it has the power of producing with its wings, and this, no doubt, has its effect upon the birds that approach its domain. This was the case in the present instance. Not a moment's quietude was allowed the crows until the whole colony was banished from the field, and they were obliged to betake themselves to the neighbouring grounds, where they could follow their occupation in peace. Not more than a few minutes elapsed until the lapwing had cleared the field of the intruders. I witnessed cases of this kind repeatedly, and always with the same effect. This faithful sentinel of its mate would allow no bird whatever to enter this field without attempting to banish it. These attacks of the lapwing were not confined to birds alone, but also to human beings. If any person happened to pass through this field, and more especially when near the nest of the female, the male immediately darted past him on all sides, and so contiguous that it might almost be touched, making the peculiarly loud noise with its wings. Thus it continued without intermission until the intruder had left the field. On one occasion I was greatly amused with a crow that it took prisoner. The crow alighted in the field near a tree, but the moment it did so the lapwing commenced its usual attack by darting close past it (on no occasion did I see it come fairly in contact with the intruder), and the crow to avoid it took refuge in the tree. The lapwing then soared away for a short distance, but never out of sight of the crow, and the latter, no doubt thinking that its enemy had disappeared, left the tree and again began to forage in the field. But this was only momentary. The lapwing was quite aware of the fact, and down again it pounced on the crow, which, as before, took shelter in the tree. This state of things continued more than a dozen times, until at last the crow, finding that neither peace nor profit could be obtained there, contrived to steal from the tree, and took its departure to some other locality, where it might forage in peace and quietness. The courageous and faithful guardian, however, at last came to an untimely end. I did not witness this myself, but was told by a game-watcher who did, and therefore cannot say whether the hawk which killed it did so without provocation, or that the latter had been annoyed by the usual attack of the lapwing to banish it from the field. However, the lapwing was struck to the ground by the hawk, and the game-watcher, thinking that he might be able to save its life, went to its rescue with all speed, but on reaching it found that the hawk had torn its head off. Since that time I have never seen the female, nor any of its young—if it succeeded in hatching them,—and the crows may now be seen daily foraging in the field without interruption.—*Dipton Burn.*

THE BETULARIA AND ITS VARIETIES.—In the month of June, 1874, I was proceeding on the outside of an omnibus from Middleton to Manchester in company with a brother entomologist, when I thought I observed a large specimen of the *Betularia*

in a plantation in the neighbourhood of Heaton Park, on the left-hand side of the high road. The driver of the 'bus, noting my anxiety to capture the specimen, very kindly promised to proceed slowly for a short distance, so as to give me an opportunity of seeing whether my impressions were right or not with regard to what I had seen. I soon reached the plantation, near the entrance to which, to my great joy and surprise, I found a large female *Betularia* of the buff variety on a tree, in conjunction with a black male. I picked them off the tree and returned to the 'bus, several of the passengers being astonished when I told them the value of my prize. Not being prepared with a box at the time, I allowed my captures to creep on my clothes, but after we had gone some distance I set the black one free, to the evident surprise of the passengers, who seemed to think that the more valuable of the two. However, on arriving at Cheetham Hill, my entomological friend procured a large-sized pill-box, and into this I placed the buff specimen. We proceeded to Belle-Vue Gardens, to spend the afternoon, though I will confess that the pleasure I experienced there received additional zest from the discovery and capture I had made during the afternoon. On arriving home I was sorry to find the specimen in a somewhat sorry condition, the box in which I had confined it having been rather too small. Fortunately I succeeded in restoring it, and I afterwards reared about 120 specimens, but, singular to say, and to my great disappointment, the buff variety did not make its appearance. At this time a friend of mine had some of the black variety, and he was kind enough to give me a few; so I crossed them, but with the same result. Still I had faith that they must have some of their parent's buff qualities in them, and I made another attempt to breed them. The result, I am glad to say, was very gratifying indeed. On the 4th of December last I placed about fifty of the pupæ in a box; for, being very eager to see the buff variety come forth, I resolved to try what artificial means would do. Impelled by curiosity, I, on the 4th of January this year, took a peep into the box, when, to my great delight, I found that one of the buff variety had emerged from the pupa. I followed up my success, and have succeeded in obtaining about one buff one out of twenty of the whole brood, some of them being all buff, and others very variable, both in their colour and markings. The foregoing information, therefore, makes me feel confident of having established two distinct varieties of *Betularia* from a domestic point of view, and possibly what I have stated may be of value to entomology, and to those who love the science.—*Thomas Lomas.*

A FIGHT WITH AN EAGLE.—The *Dagbladet*, a Danish newspaper, for July 10th, 1876, gives the following account of a rare incident which occurred on the previous Wednesday evening upon Rövling Heath, in the district of Aalborg, Jutland. Two girls, eight and twelve years of age, having been sent by their parents to fetch home the cows from the heath, were attacked, while returning, by a very large eagle, which made several attempts to swoop down, but was deterred by the elder girl swinging a tethering mallet over her head till she could procure some stones; these she hurled against her powerful antagonist, and was at last so fortunate as to strike it with such effect that it fell dead. It measured from tip to tip of its extended wings, six feet eight inches (3½ alen), and weighed about ten pounds (9 pund). Its largest claws were from an inch and a half to two inches long; its colour was intermingled grey and white.—*J. Wager.*

COLIAS EDUSA AND ITS VARIETIES.—At the time my few notes on this interesting butterfly were written, which appeared in SCIENCE-GOSSIP, No. 156, p. 280, I considered myself fortunate in securing *two* of the white varieties, having collected thirteen or fourteen years, and being obliged till this year to put up with one tattered English and a foreign representative. Since then, however, my brother and I have captured forty-five *Illice*, forty of which were taken in one field close to this town. The specimens exhibit much variety in colour, some being a rich cream and primrose, others a greenish white; in the size of the marginal spots there is also great difference; in some they are reduced to a minimum.—*Joseph Anderson, Junior, Chichester.*

DESTROYING MITES. — Your correspondent, "A. F." will, I think, find no difficulty in ridding his collection of mites, if he will adopt the following plan, which I have never known to fail. It is simply to dip a camel-hair brush into benzine, and let the fluid fall upon the insect drop by drop until it is completely saturated; the little heaps of dust which usually betokens the presence of mites underneath the specimens can be wiped up with the brush. On account of the extremely volatile nature of benzine, it is not of much use as a preventive for this purpose; it is better to employ plenty of camphor, or cotton wool soaked with a solution of carbolic acid. With even ordinary care mites need never be permitted to do any serious mischief, and no better piece of advice for their prevention can be given than that by Dr. Knaggs, to put into quarantine every insect we receive.—*Joseph Anderson, Junior, Chichester.*

DESTROYING MITES.—Many years since I left two cabinets of lepidoptera in the country for some twelve months, and on bringing them home found the bodies of many of the specimens eaten, and the mites travelling over the drawers in large numbers. I made a saturated solution of camphor in rectified spirit of wine, poured about a teaspoonful in one corner of each drawer, and by tilting, caused the liquid to flow round the angles; I then closed the cabinets, and on opening them a few days after found all life extinct. If "A. F." has not a compartment in each drawer for camphor, he should procure some muslin bags about two inches by one inch and a quarter, put a lump of camphor in each, and fix one in a corner of every drawer by a pin at both ends, renewing the camphor as often as it evaporates. By this means he may preserve his collection from injury by mites for any period.—*D. S.*

THE SUN AND THE EARTH.—I have the following figures before me of the distance between us and the sun. Taking Guyot's mean diameter of the earth, giving a radius of 3,938 miles—
Laplace gives a distance of miles = 92,636,990
The *Quarterly Review*, July, 1875,
note, p. 209 = 91,000,000
The *Academy*, 20th October, 1877,
p. 389 = 93,000,000
The *Mail*, 19th December, 1877,
in a letter from Mr. Proctor
{ Tupman = 93,321,000
{ Newcomb = 92,393,000

Mr. Proctor suggests that this measure is untrustworthy, as long as we get warmth and light, the actual distance of the sun is of little consequence; but what are the precise sciences to do? Newcomb and Laplace are as near the mark as we can hope for; but how is it that the precise sciences reach their conclusion as to the size of this world from the Nebular hypothesis of Laplace, without adopting his

measure of distance between the earth and the sun? I find the figures for Laplace in his translation by J. Pond, p. 24, 1809. Will some one kindly tell us which distance is right?—*H. P. M.*

REASONING POWER OF DOGS.—Having witnessed the following occurrence some years ago, I could not help being struck with the great reasoning powers displayed by a dog. I lived in the town of N—, and the back of our terrace had small gardens, separated from each other by a short fence. One windy morning the clothes were drying on the line, and the dog (a fine retriever) was sporting itself on the grass, when a sudden gust blew the "things" on the ground; the dog at once ran into the house, and by sundry barks and pulls at her dress, induced the girl to go into the garden, where she discovered the cause of the dog's uneasiness. The next day being the "week's wash" of our neighbour, the clothes were airing in the garden, when our dog rushed into the house, and presently brought out the servant, who found that the prop had given way, and the "wash" was all on the ground.—*J. D.*

SUPERSTITIOUS DISLIKE TO THE WREN (*Troglodytes Europæus*).—This little bird, though generally a favourite, is in some rural districts regarded by the uneducated with the bitterest aversion, while its relative, the Redbreast, is considered sacred from all molestation. So deeply seated is this hatred to the Wren, that its nest is often ruthlessly torn away, and both nest and its contents trampled under foot. The only explanation which these good folks will vouchsafe, is that the "wren" is the *devil's* bird, and should therefore get no quarter. This strange superstition has, I believe, had its origin in one of the many myths which have been handed down from generation to generation, and received as truth beyond question. The legendary account of how the Robin got her red-breast is widely spread, both in Ireland and England, and no one in this country will molest the "poor robin," because his name is associated with our Lord; but the Wren has the misfortune of being associated with the sacred history in an unfavourable light: hence the odium which hangs around him. In the south of Ireland it appears this unkindly feeling does not exist, which is shown by a curious practice which existed at no very distant date in Cork. On St. Stephen's day a number of young men, in holiday dress, paraded the city, carrying a furze-bush, in which a wren was secured. As they stopped before the house, one of their number recited the following lines—

"The wren, the wren, the king of all birds,
Was caught St. Stephen's day in the furze;
Although he's little, his family's great,
Then pray, kind gentle folks, give him a trate."

It is to be hoped that this cruel and unmeaning dislike to a little bird of which poets have so sweetly sung, and naturalists so interestingly written, may ere long be swept away by advancing education.—*H. Allingham, Ballyshannon.*

HAREBELL (*Campanularotundifolia*).—The English name, we are told, was bestowed upon it because it grows in the dry and hilly pastures frequented by the hare, but we would suggest, at least, an alternative derivation—or rather the plant itself suggests it—as to whether it may not have originally been named *hair bell* from the extremely light and delicate stems from which the blossoms hang. Another plant, equally light and delicate, is named the maiden-hair. I have extracted the above from p. 78, part 10, of "Familiar Wild Flowers," to which I refer Mr. Tate for an interesting article on the plant.—*T.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP at least a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

FRESH CHARA.—A correspondent asks our good offices to obtain for him "a little fresh *Chara*." Will our botanical friends, who can obtain it, send us a small supply?

W. PATRICK.—You can purchase *Anodons* of R. Damon, F.G.S., Weymouth.

A. F. FISCHER.—You cannot do better than preserve the chrysalis in the earth of a flower-pot. Put the latter out of doors. It will soon cease "wriggling." Out of doors is their natural condition of hibernation.

W. H. LEGGE.—The caterpillar of which you sent us a coloured drawing, is that of the well-known Pale Tussock-moth. The caterpillar goes by the name of the "Hop-dog" (*Orgyia pulbundata*).

E. M. (Saddleworth).—The specimens sent us from the turpits are flint chips, and seem to us to be the result of human handwork. This appears all the more probable from the fact that flint is a very rare mineral, even in the drift beds, in your district. Can you send us some larger specimens for inspection?

W. H. S. (Colchester).—We shall feel obliged if you will send us some of the insects which demolish the "black beetles," as we cannot identify them from your description.

W. S. WAKEFIELD.—The plant sent us is *Veronica Hendersonii*.

F. COLEMAN.—We have heard of no other instance of non-fertilism except your own.

J. A. SANDFORD (Ohio).—Accept our thanks for specimens of *Apocynum androsaemifolium*.

C. W. H.—There is no fear whatever of the ants doing your *Deodaras* any harm.

COLONEL M.—You had best have SCIENCE-GOSSIP sent to you direct from the publishers. The small crystals are carbonate of lime.

F. R. B.—We cannot, of course, tell you the name of the species of mussel without seeing specimens. But there is no doubt that the deposit in question is a post-glacial one, of the same age as our raised beaches.

F. Q.—You had best consult Whitaker's "Geology of the London Basin," published by Her Majesty's Stationery Office, for details of and references to the various sections of the Woolwich beds exhibited in the neighbourhood of London.

S. C. M.—Sach's "Botany," translated and edited by A. W. Bennett and Professor Dyer, and published by the Clarendon Press, gives the best account of the laws of vegetable growth and development.

A. M. (Wandsworth).—The crustacean, of which you sent us a drawing is *Idotea tricuspida*.

J. RANSOM.—We have no doubt that Mr. Bartlett, the Superintendent of the Zoological Gardens, would give you all the necessary information respecting the management of Marmosets.

T. C. M.—We have referred to the MS. of your "Exchange" in the January number, and find that we printed it exactly as you wrote it!

R. T. ANDREWS.—The "glass-like substance" you sent us is *Selenite*, or crystallized sulphate of lime; very likely from the London Clay formation.

J. CUNNACK.—Your written description of the Hawk answers best to that of the common Buzzard (*Buteo vulgaris*).

W. K. AND OTHERS.—Your specimens have been forwarded to competent authorities to be named, and their names will appear in these columns as soon as we have received them.

E. R. F.—Potton, in Bedfordshire, is situated on the Lower Greensand formation, and the fossils you mention are, no doubt, from that deposit.

W. B. wishes for the address of the South London Entomological Society, as it has removed from its old quarters. We shall always be glad to chronicle such changes of removal.

C. HARRIS.—Many thanks for the specimens, which are very interesting. But we cannot undertake to name zoophytes from the Cape of Good Hope, or any other place where the fauna has not been scientifically worked and described.

EXCHANGES.

WANTED, British examples of *Vertigo angustior*, *V. alpestris*, and *Acme lineata*. Will give a liberal exchange in American land and freshwater shells.—G. Sherriff Tye, 62, Villa-road, Handsworth, Staffordshire.

WANTED, Microscopical Dictionary (old or new edition), in exchange for foreign insects, chiefly parasites, mounted or unmounted.—Address, M., Anglesea Lodge, Godalming, Surrey.

I WOULD like to exchange U.S. Coleoptera for British or Foreign. Eggs in exchange for Coleoptera, if desired.—Address, Geo. J. Angell, 64, Elliott-place, Brooklyn, New York, U.S.

WANTED, Fresh specimens of any Cuttlefish or Squids. Offered in exchange, shells, insects, microscopic slides, scientific books, or money.—W. Cash, 38, Elmfield-terrace, Halifax.

A FEW well-mounted micro slides to exchange—Lists to T. Shripton, The Terrace, Chesterfield.

MANY species of British marine, land, and freshwater shells—offered in exchange for land shells from New Zealand, South America, Madagascar, and South Australia.—F. M. Hele, Fairlight, Elmgrove-road, Cotham, Bristol.

FOR unmounted or mounted diatoms will be sent some cleaned diatom *Cocones Pliacentalis*, or Foraminifera from Spain; also, river mud from Lagos, for any object of interest for microscope.—A. Smith, 198, Essex-road, London.

FOR Tripoli, composed of diatoms, send well-mounted slide in exchange.

IN exchange for any other mounted objects: Proboscis of Blow-fly, *Pleurosigma angulatum*, *Amphipleura pellucida*.

To French Marine Botanists. Wanted, in exchange for British sea-weeds, those of French growth.—H. G., 15, Mulgrave-street, Plymouth.

EXCHANGE microscopical slides of different stages of the Pentacrinite larva of Conatula, various species of Marine Polyzoa, with their tentacles exerted, Australian seaweeds, &c. (list forwarded on application), for other thoroughly well-mounted slides. Illustrations of animal and vegetable structures preferred.—Adolph Leipner, 47, Hampton Park, Cotham, Bristol.

SEVERAL sets of six-opaque sections of coal plants and tissues; wanted, recent and fossil polyzoa, graptolites from Silurian strata, or vegetable preparations. Several sets of six recent and fossil foraminifera; wanted foraminiferous material, soundings, dredgings, or unwashed Lias clay.—G. R. Vine, Attercliffe, Sheffield.

DUPLICATES.—*Rhamni*, *Edusa*, *Cardamines*, *Aegeria*, *Semele*, *Atalanta*, *Cardus*, *Io*, *Paphia*, *Galathea*, *Quercus*, *Xanthographa*, *Desiderata*, *W. Album*, *Betula*, *Pruni*, *Panicus*, *Atropis*, the *Sestidae*; many *Noctua* and *Geometrae*.—A. Dent, 20, Thurlow Square, London, S.W.

A LARGE number of leaves with stellate hairs *in situ* from all parts of the world, in exchange for other good microscopic objects.—H. L., 6, Upper Phillimore Gardens, Kensington, W.

WANTED, *Erythraea latifolia*, other plants in exchange.—Rev. F. H. Arnold, Fishbourne, Chichester.

SEND 2 good slides for 1 dozen patent mounting clips, brass, new kind, and capital to work with.—W. Tylar, 165, Well-street, Hockley, Birmingham.

EXCHANGE or otherwise.—A Ross's $\frac{1}{10}$ in. object-glass—wet and dry—a useful glass.—Apply to Rev. S. Bramhall, St. John's Vicarage, Lynn.

LYELL'S "Principles of Geology," 4 vols., boards, 1834. Figuier's "Primitive Man" (quite new), will exchange for British Birds' Eggs, or well-mounted British wild plants or mosses.—J. R. Murdoch, Horsforth, near Leeds.

BOOKS, &c., RECEIVED.

"Elementary Botany," Part II. By W. Bland. London: Benrose & Sons.

"Industrial Art." January.

"Popular Science Review." January.

"The Midland Naturalist." January.

"Land and Water." January.

"The Naturalist." January.

"American Journal of Microscopy." December.

"Canadian Journal of Entomology." December.

"Potter's American Monthly." December.

"Boston Journal of Chemistry." December.

"Journal of Applied Sciences." January.

"Ben. Brierley's Journal." January.

"Chambers's Journal." January.

&c. &c. &c.

COMMUNICATIONS HAVE BEEN RECEIVED UP TO THE 7TH ULT., FROM:—T. S.—T. B. W.—T. L.—G. C.—Dr. R. C. R.—G. S. T.—C. F. G.—W. B.—H. P. M.—A. M.—D. A.—W. H. P.—W. H. S.—G. S. B.—Mrs. B.—D. S.—J. A. jun.—C. V. S.—G. C. D.—G. P.—A. R.—J. D.—C. P. O.—W. B. G.—G. A. H.—W. W.—S. E.—H. C. D.—R. C.—P. D.—H. A.—W. C.—G. J. A.—T. S.—J. S. L.—W. J. F.—T. B.—M. K.—J. G.—A. C. A.—S.—C. C. H.—A. D. M.—W. J. S.—T. C. M.—J. C.—A.—S.—R. T. A.—F. N. H.—J. H.—W. R. T.—Dr. B.—W. S. B.—J. B.—W. B.—C. E. B. H.—M. L.—J. B.—J. P.—W. W.—T.—W. W.—G. L.—G. C.—G. E. B.—H. L.—H. P.—A. L.—G. R. V.—A. D.—C. H.—J. R. M.—H. E. W.—W. M.—J. B.—C. B. M.—T. B.—A.—W.—R. S.—T. F.—U.—H. A.—A.—R. G. C.—Dr. F. C. C.—W. K.—E. R. F.—J. B.—W. B.—H. G.—C. D.—&c. &c.



THE FLORA OF NATAL.

By J. M. WOOD.



S possibly some of your readers may feel interested in a few notes on the flora of this part of the world, I will, with your permission, enumerate a few of the native plants at present growing in my garden. I reside about twelve miles from the sea, and though my garden is neither extensive nor particularly well kept, still I have taken pleasure in adding to it some of our beautiful native plants, a number of which were already growing in it when I came to reside here, having been planted by a former occupant. The first plant which attracts the eye at this season is *Grewia Sutherlandi*, a shrub or small tree, now covered with its beautiful scarlet flowers, though the leaves have hardly yet made their appearance; it is a sapindaceous plant, though its true position appears to be doubtful, and is a native of the higher districts of the colony, in the Drakensberg, a range of mountains on the border of the colony. I am told that its spikes of flowers are sometimes a foot or more in length. Here it is usually called the "Natal Bottle Brush," but it is rarely seen in cultivation, as, on the coast, at least, it does not succeed well. Close beside it is *Crinum Capense*, usually called in the colony the "Natal Lily," and everywhere found in profusion, from the coast to far inland; and in the spring and early summer producing its corymb of pink and white bell-shaped flowers. Near this plant is an *Arum*, of the genus *Richardia* (known here as the "Lily of the Nile"); it is now out of flower, but in the season flowering freely without the slightest care or attention. On the opposite side of the walk is another *Arum* of the same genus, whose leaves are spotted with white, like a *Caladium*, and which has a primrose or yellow spathe, and which is in this district quite plentiful. Beyond this plant, and scrambling about amongst the

adjacent shrubs, is a species of *Mesembryanthemum*, with small but richly-coloured deep magenta flowers; and near it another species with larger white flowers, and which is in some places near here quite common. In the middle of a small grass-plot in front of the house are two plants of *Encephalartus*, a cycadaceous plant, which sometimes has a caudex 10 feet or more high; one of these plants, though its stem is only about 18 inches high, has produced three large cones in the centre of the crown of leaves or fronds, something like overgrown pine-apples. It is, I think, a male plant, though the scales are not yet sufficiently separated to decide with certainty; during the five years that I have observed the growth of these plants, they do not seem to have increased much in height, but as they only put forth one crown of leaves in each season, this is not to be wondered at. The largest plant has upon it at the present time four sets of leaves, the lowest whorl of which are now nearly five years old, and rapidly decaying; but when the spring has fairly set in it will unfold another complete crown of leaves, and thus the trunk gradually increases in height year by year. These plants were brought from Noodsberg, twenty miles from here, where they grow on the sides of precipitous rocks and under slight shade, at an elevation of 3,000 feet or more above the sea-level. We have a species of cycad growing in similar situations near here, but which does not, even in old age, develop a trunk; its root is napiform, and, when dug out, as much as a man can carry with comfort; it bears pinnate leaves 6 feet or more long. Near this latter plant is *Stangeria paradoxa*, also a cycadaceous plant, found, I believe, only in Natal, and named in honour of the late Dr. Stanger, Surveyor-General. It is a very common plant in this neighbourhood, both in the open grass and in bush, and has the fruit of a conifer with the venation of a fern. On one side of the grass-plot is a fence formed of an apocynaceous plant of the genus *Carissa*, called here the "Amatungulu," and which bears a fruit which is much esteemed. It has pretty white star-like flowers, and plum-shaped

scarlet fruit, but its double or forked thorns make it a rather unpleasant plant to come violently into contact with. The fruit, when unripe, is rather astringent, and full of a white milky juice; and it is a standing joke here, that J. C. Byrne, the emigration-agent in the earlier days of the colony, when speaking in England of the natural products of the place to which he wished to attract the emigrants, said that in Natal the strawberries and the cream grew upon the same plant. The fruit is extensively used for making jams and jellies, a large quantity of which is, I believe, exported. At each end of this fence, and also around and near the house, are trees of *Eucalyptus globulus*, a native of Australia, some of them 70 feet high, though I believe only twelve years old; and twining round one of these gum-trees is the stem of a native plant, *Testudinaria elephantipes*, the Tortoise-plant, or Elephant's foot, a singular-looking plant, belonging to the family *Dioscorea*, or Yams. Its rhizome, which is above ground, is hard and tessellated; and in my specimen the resemblance to a tortoise is sufficiently startling. It is perennial, and sends up a slender twining stem to the branches of the trees amongst which it grows, while the rhizome sends down tough wiry rootlets, with which it takes firm hold of the ground. The specimen under notice was the first which I had seen, and in climbing up some rocky ground I placed my hand upon it, but quickly withdrew it under the impression that it was the shell of a tortoise. There are, I believe, two species of this plant in the colony, but I have only met with one as yet. We have also two species of *Gardenia*, *G. globosa*, now completely covered with its creamy bell-shaped flowers, and *G. grandiflora*, with larger, salver-shaped flowers, which fill the garden with a delightful perfume. Then there is that rare plant, *Machaya bella*, with its pale lilac pendulous flowers and curiously-veined corolla. I have been informed that this plant is only found wild in the valley of the Tongaat, but whether this is correct or not I do not know; at any rate, it is not by any means common. Then we have a croquet-lawn, formed of a running grass which is commonly used for that purpose here; and at one end of it stands a row of trees which have originally been stakes in a post and rail fence, but which have now grown into trees, some of them fine ones; two belong to a species of *Aralia*, common here, and much used for fencing, as the post will generally take root. Two others are fig-trees, of a species plentiful about here, and which have now grown into fine spreading trees, 20 to 30 feet high, with leaves which are thickly covered underneath with small peltate scales or glands, the use of which I have not been able to discover. While the leaf is fresh, they appear, under the microscope, to be closely adpressed to the leaf; but as the leaf dries, they curl up at the edges, and are then easily detached, leaving a small pit or hollow. Three more of these trees belong to the genus *Erythrina*, or, as it is called here, "Kafir

Boom," and are now covered with beautiful scarlet blossoms, but without a single leaf. This tree is common in the colony, and during the winter months its magnificently-coloured flowers make it a very conspicuous object. We have several species in the colony, two of which are growing here; one is usually called the "Cork-tree," as its bark has much the appearance of rough cork; its leaves are large and coarse, and the wood of both species is so light, that I believe it is sometimes used for floats in fishing. I have used it for setting butterflies, for which purpose it answers almost as well as cork, which is not procurable here. And I have no doubt that it may yet be put to many other uses, though at present it is not used, as far as I know, for anything but fencing. I have also a small fernery, of which I may have something to say on another occasion, should it be acceptable to your readers, and also about the numerous wild flowers growing so profusely in this neighbourhood.

THE LATE ANDREW MURRAY, F.L.S.

BY the death of Mr. Andrew Murray, which occurred on the 10th ult. at his residence in Bedford Gardens, Kensington, entomology and botany loses an assiduous and careful worker. Born in Edinburgh in 1812, he paid some attention in his youthful days to the study of medicine. He was, however, educated with a view to following the law as a profession, and for a short time practised as a Writer to the Signet. Subsequently he assisted his relative, John Murray (Lord High Advocate), in his desire to provide some practically useful reading for village schools by writing a little pamphlet entitled "The Skip-jack; or, Wire-worm and the Slug," which, though published without his knowledge, may be considered as his first contribution to economic entomology. The year preceding his removal to London, he contributed to the "Transactions of the Royal Society of Edinburgh" a paper relating to a subject then under discussion, as to what extent the unity of species in the parasite showed unity of species in the animal preyed upon; "the pediculi infesting the various races of man," giving minute descriptions and considerations as to how far the variations might be considered to amount to specific differences.

After his removal to London in 1860, Mr. Murray devoted himself specially to the sciences of entomology and botany. About this time he became officially connected with the Royal Horticultural Society, being appointed assistant-secretary. After relinquishing this post, he continued, almost to the moment of his death, to show a great interest in the society, being one of the strongest supporters of, and most frequent attendants at, the meetings of the scientific committee.

In 1869 he formed one of a party, including Sir

Joseph (then Dr.) Hooker, of representatives of English science at the Botanical Congress at St. Petersburg. In acknowledgment of the service rendered on this occasion, he was presented by the Emperor Alexander with a splendid malachite table. During his absence from England at this time, he paid considerable attention to the subject of Continental forestry, and every facility was given him in his inquiries in Belgium by the Belgian Government. In 1871 he undertook the laborious task of superintending much of the selection or arrangement of the English exhibits at the Polytechnic Exhibition at Moscow in the following year. In botanical science, Mr. Murray's work lay principally among the Coniferae, having written a small book on the "Pines and Firs of Japan," and contributed numerous papers on the same group of plants to different scientific and horticultural journals. He was secretary to the Oregon Committee, who sent out a collector to Oregon and California to collect Coniferae, and in 1873 he undertook an expedition to Salt Lake and California, partly with a scientific object, and partly with a view to investigate the working of the silver-mines. In the course of his mining investigations he was exposed to considerable danger, minute inquiries making him obnoxious to some of the parties concerned.

In his entomological career, the great point was the devotion of the last ten years of his life to the subject in its practical bearings. As a monument of his skill and profound knowledge on this point, the results stand in the Government collection of economic entomology at Bethnal Green. The charge of receiving and arranging the contributions to this collection was placed in his hands officially in 1868, and from thenceforward he may be said to have given himself up to the task unceasingly, down to his latest hours; for, during his American expedition, he left behind him the threads by which the collection might be proceeded with in his absence.

Of the patient labour and scientific research he displayed in this collection it is impossible to speak too highly. Under his guidance the life-histories of the insects (of which knowledge was required to ascertain their remedies) were, in some cases, worked out, in others verified and amplified; remedies were ascertained and experiments initiated; and the whole life-history was shown at once correctly, scientifically, and as clearly as possible to the popular eye by illustrations of the insect in its various stages, and the object injured, accompanied by drawings and, when possible, *fac-simile* models. Mr. Murray was an accomplished draughtsman, and a large number of the insect drawings are his own work, in all cases clearly executed, and many, especially those of the Coleoptera, really works of art. On this collection he was working up to his latest days, having, we believe, a quantity of material in progress of arrangement. It is much to be regretted that his descriptive catalogue of the collection should not have progressed

beyond the first volume devoted to the Aptera, which was to have been followed, as we learn from an introductory note, by a complete series. The compilation of such handbooks is a work requiring great knowledge of the subject, as well as familiarity with writings of previous observers, and the head and hand which formed the collection could best give us the description which utilizes it for general reference.

Mr. Murray contributed valuable papers of original observation both to home and foreign scientific societies and serials, and amongst his larger works, his volume on the "Distribution of Mammals" is one of very great value, with regard to the representation of families, both prehistoric and present, and also for its synonymic lists and tables.

It is said that Mr. Murray's health suffered much during his American tour, but that the immediate cause of the unfavourable change was due to the amount of chloroform inhaled whilst rearranging a portion of the Doubleday collection infested with Mites. He was not in strong health at the time, but continued at his post from day to day, trusting that after effects might wear away; his general health, however, sank from that time, and all who had the privilege of knowing him will feel that by the death of Andrew Murray they lost a true-hearted and loyal friend, as well as a gifted naturalist. J. R. J.

ON SOME RECENT FORAMINIFERA FROM THE SHETLAND ISLES.

By GEORGE ROBERT VINE, JUN.

SOME time ago my father gave me a small packet of dredgings that he had received from Mr. Lovett, Holly Mount, Croydon. The dredgings consisted of minute particles of broken shells, quartz, &c., but especially of Foraminifera. These I worked out, and the following is a list of the species obtained.

Globigerina bulloides, D'Orb., both in the young and mature state, were very plentiful; *Rotalia Beccarii*, Linné, very small, but showing the character of the genus well; *Rotalia orbicularis*, D'Orb., and varieties, small, transparent, and perfect, common; *Planorbulina (Truncatulina) lobatula*, Walker and Jacob, very common in Dog's Bay, &c., but only 8 or 9 specimens here represented the genus, and all these were not very distinct in the septa and foramen, but distinct enough to identify the species; *Operculina ammonoides*, Gronovius. This is a species that can hardly be mistaken for another, being ammonite-like (as the name implies), with the septa distinct and double (see fig. 31); small and middle size, rare; *Pulvinulina Micheliniana*, D'Orb. (see fig. 28). This is a peculiar species: it has three different views; the front is raised very much, with the septa rather wide apart; the bottom is flat, with two convolutions showing the primordial, and the side view is bell-shaped; middle

size, rare. One species, resembling a *Nonionina*, is rather common: it is middle size, and has all the septa, foramen, &c., very much obliterated. Another most beautiful form is very common: it is small, semi-transparent, and very distinct; the segments overlap one another, and in the 3 or 4 segments the septa form a fork-like arrangement; the foramina are clearly seen with a low magnifying power. This one, with figs. 33 and 34, I cannot name, and I should feel obliged if anybody could help me to name it.



Fig. 25. *Lagena distoma*; nat. size, $\frac{1}{4}$ in.



Fig. 26. *L. globosa*; nat. size, $\frac{1}{8}$ in.



Fig. 27. *L. sulcata*; nat. size, $\frac{1}{8}$ in.

Of the genus *Textularia*, small, transparent, and perfect specimens were very common, but the larger and opaque ones rare. Five species of *Textularia* were found, but there is only one of them that I can name, and that is *Textularia abbreviata*, D'Orb.: it is small, transparent, and rare. Two other species



Fig. 28. *Pulvinulina Micheliniana*; nat. size, $\frac{1}{4}$ in.



Fig. 29. Side view of ditto.



Fig. 30. Front view of ditto.

were small and transparent. One of these I have figured to show the points protruding from the side of the shell. One of the opaque forms is about the $\frac{1}{4}$ of an inch in length. The chambers go down to a fine point, are rather wide at the top, and a slight bit wider in the middle. It is very difficult to recognize the species on account of the middle portion being covered over by some arenaceous matter, thereby hiding the characters that in some respects determines the species.

Of the *Lagenida*, some very good species here represented this family. The first of these is the neckless variety of *Lagena sulcata*, Walker and Jacob. It is a small form, and rather rare: only one of the three specimens obtained show the lines that traverse the shell distinctly. *Lagena globosa*, Montagu (see fig. 26). This form is very small and rare. It is a globular shell without any striæ or foramina visible. *Lagena distoma politia*, Parker and Jones. This is an elongated species, having the neck about half the size of the body. All three of these species of *Lagena* have been figured by Messrs. Parker and Jones in their paper on the Arctic Foraminifera, in the Philosophical Transactions for 1865, Part I. *Cristellaria rotulata* (fig. 36), Lamarck; small and middle

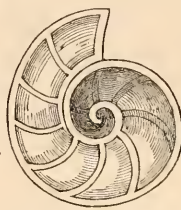


Fig. 31. *Operculina ammonoides*; nat. size, $\frac{1}{2}$ in.

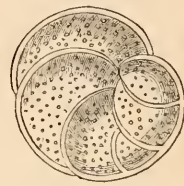


Fig. 32. *Nonionina* (?); nat. size, $\frac{1}{8}$ in.



Fig. 33. *Textularia*, sp.



Fig. 34. *Uvigerina fytmaea*; nat. size, $\frac{1}{32}$ in.

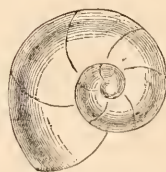


Fig. 35. *Rotalia orbicularis*.

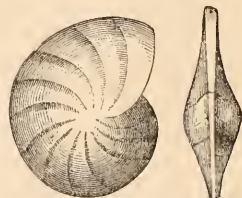


Fig. 36. *Cristellaria rotulata*; nat. size, $\frac{1}{2}$ in.

size, rather rare. A good specimen, showing the septa well. Another peculiar species is an elongated form traversed by rather deep furrows, as in *Lagena sulcata*, with the septa placed in rather irregular positions. Four good examples were obtained, all showing different characters (see fig. 34). The *Miliolida* family was here represented by three very characteristic species. The first was *Triloculina*

oblonga (?). These were very minute and indistinct; rather rare. *Biloculina ringens*: this is a most beautiful and perfect specimen; it is of a white colour and middle size. Rare. *Spiroloculina canaliculata*, D'Orb. (fig. 37). Two perfect examples of this species were found, showing the character of the genus well. Small and rare.

In this short paper I have endeavoured to give an idea of the character of the Foraminifera found at Shetland. I have not given all the species found there, and only those that I possess myself. I have drawn the figures myself, without the aid of the camera lucida. In my research among this bit of sand I find that nearly all of the Foraminifera are of

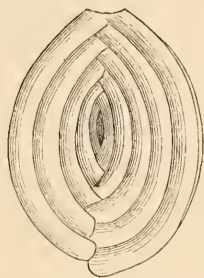


Fig. 37. *Spiroloculina canaliculata*; nat. size, $\frac{1}{10}$ in.

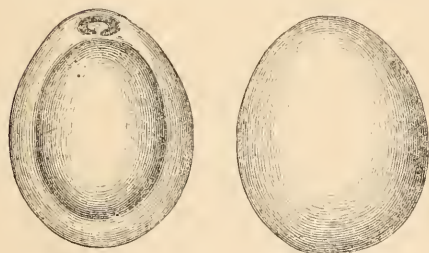


Fig. 38. *Biloculina ringens*; nat. size, $\frac{1}{32}$ in.

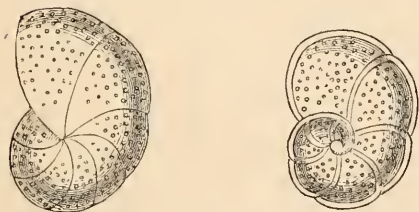


Fig. 39. *Truncatulina lobatula*; nat. size, $\frac{1}{16}$ in.

Fig. 40. Ditto, other side.

a brownish colour, showing that the water is impregnated with oxide of iron; also that the *Globigerina* are dwarfed and thin, owing to the shallowness of the water, 120 fathoms, whilst the same species from the Atlantic, at a depth of 1,450 fathoms, are larger and more bulky. And this gives the fact that the *Globigerina* grow larger and more bulky in deep water, whilst they are dwarfed and thin in shallow water.

Attercliffe, Sheffield.

NOTES ON THE DEVELOPMENT OF FROG'S SPAWN.

By A. M. M'ALDOWIE, M.B.,

Member of the North Staffordshire Naturalists' Field Club.

PROBABLY no animal is better known, from an anatomical and physiological point of view, than the Common Frog. Developmentally the frog has been specially studied, on account of the interesting metamorphoses through which it passes before it arrives at maturity, and also on account of the advantages which its egg offers for the examination of the ovum, the transparent albuminous covering affording unrivalled facilities for observations on, and experimental investigation into, the subject of development. The microscopic structure and changes



Fig. 41. Frog's spawn; nat. size, March.

Fig. 42. Ditto, April 4th.



Fig. 43. Ditto, April 8th; dorsal aspect; lateral aspect.

Fig. 44. Ditto, April 11th; dorsal aspect; lateral aspect.

which are observed during the development of the embryo of the frog, are described and figured in most text-books of comparative physiology and histology, but the ordinary naked eye appearances and modifications which it exhibits are not to be found in these works. Nearly all zoological manuals give a series of illustrations representing the various stages in the development of the tadpole after its escape from the egg, but they do not figure the alterations which take place previously, without which the series cannot be considered complete. St. George Mivart, although he details the process of yolk subdivision and cleavage, and the other microscopic changes through which the embryo passes, yet with regard to the naked eye appearances he merely states,* "Gradually the embryo assumes the form of a young tadpole, and is provided with a pair of little 'holders' (or organs for adhesion), just behind the mouth, with six openings on each side of the neck, and with a pair of rudimentary external gills." Huxley, in what is undoubtedly the best work on the frog extant, in reference to this subject says,† "While still within the egg the embryo assumes the form of a minute fish, devoid of limbs and with only rudiments of gills, but provided with two adhesive discs on the ventral

* The Common Frog (Nature Series), 1874, p. 15.
 † Elementary Biology, 1875, p. 155.

side of the head behind the mouth." The following notes, although very crude and imperfect, may serve to draw the attention of some of the readers of SCIENCE-GOSSIP to this interesting subject during the season which is now approaching. I intended to supplement them the following year, but had no opportunity of doing so.

About the end of March, 1874 (exact date uncertain), I exposed a mass of frog's spawn to the light in a glass tank, placing it in a window having a westerly aspect. There was no fire in the room. The small round ovum (fig. 41) gradually became elongated, assuming at first an ovoid form, but afterwards one end became attenuated, while a small groove formed near the other extremity, and on the 4th of April most of them presented the appearance shown in fig. 42. As the embryo enlarged, these characters became more marked, until, on the 8th, the form of the head and the body could plainly be detected (fig. 43).

April 8th. Most of the embryos show signs of animation. The movements consist of alternate flexion and extension of the body, the animal folding itself up laterally and then straightening itself at intervals of about half a minute. Movements first observed in the afternoon, and continued till sunset.

April 9th. Movements more active than yesterday, but still as restricted as before.

April 10th. Movements not quite so quick as yesterday, but more extensive and fish-like.

April 11th. Most of the tadpoles appear to be trying to free themselves from the albuminous mass by quick wriggling movements. External gills very plainly seen on all (fig. 44). They first appeared as two small protuberances, situated one on each side of the hinder part of the head. These gradually elongated, divided and subdivided, until they presented the appearance of small branched filaments.

April 12th. Tadpoles all out this morning. Arrange themselves in clusters with their heads all in one direction. Most of them remain quite motionless, but a few swim actively about the tank.

Stoke-on-Trent.

A GOSSIP ABOUT NEW BOOKS.

THE present winter has not been remarkable for the number of scientific books issued. When wars and the rumours of wars prevail, and the reading world has its taste demoralized by the vivid descriptions of such rapidly-succeeding events as those which have marked the history of the last six months, it is hardly to be wondered at that scientific literature should retreat almost to the vanishing-point. But there is a break in the clouds, and thoughtful people are hoping that the storm will clear away as fast as it gathered; then we shall return to soberer literature than war and anti-war newspaper leaders, with a sense

of relief and a fervent thankfulness for our narrow escape.

Notwithstanding the paucity in the issue of first-class scientific books, the appearance of a new volume from the pen of Darwin is always sufficient to create interest. And perhaps of the works which that industrious author has recently published, none is more important than the present work, entitled, "The Different Forms of Flowers on Plants of the same Species" (London, John Murray). Herein Dr. Darwin has entered into the minutest and fullest investigation of the inner structures of flowers. We now find how abundant are the phenomena of *trimorphism* and *dimorphism* (only a few years ago deemed so peculiar and exceptional), and that the number of species bearing *cleistogamic* flowers is also being added to every day; that the latter structure of flowers, produced by exceptional circumstances, varies from one extreme to the other, and that these extremes are connected by an insculating series. Thus the Grass Pea (*Lathyrus nissolia*), bears cleistogamic flowers, which can hardly be told from the ordinary flowers just before the latter finally expand. At the other extreme we find cleistogamic flowers which are actually fertilized beneath the soil, and so are little above the condition of subterranean buds. Dr. Darwin further enters into the sizes and shapes of the pollen-grain produced by different-sized stamens in dimorphic and trimorphic plants. The absolute necessity for crossing to be produced, by the pollen from the flower of one plant being carried to the pistil of another plant, comes out strikingly in Dr. Darwin's experiments; for it is proved that very little is gained by the pistil of a flower being fertilized by the pollen of another flower borne by the same plant. The origin of monoecious and dioecious flowers, of nectaries in flowers, and many other singular and striking botanical peculiarities, are here discussed in the easy but philosophical style for which all the author's books are celebrated. It is truly a rich treat to the botanist to peruse such a book as this, and one to which all our readers who have not yet read it will thank us for attracting their immediate attention.

"The Antelope and Deer of America," by John Dean Caton, LL.D. (London, Trübner & Co.), is a handsome treatise upon the natural history, including the characteristics, habits, affinities, and capacity for domestication, of the *Antilocapra* and *Cervidae* of North America. This is a question of the deepest importance in practical natural history, and one which has been too much neglected. Books on wild animals usually tell us more about their destruction under the name of "sport" than of possibilities of their domestication and utilization. Dr. Caton tells us he has for many years kept in domestication the American antelope, and all of the American deer of which his book treats, except the moose and the two species of reindeer. This book deals with the important and difficult subject selected by the author with a fulness

which leaves nothing to be desired. The structural affinities and habits of the various kinds of deer, and their comparison with each other, are most clearly set forth. To a zoological student this book has a peculiar and special value. The woodcuts are numerous, original, and well done.

"Proteus; or, Unity in Nature," by C. B. Radcliffe, M.D. (London, Macmillan & Co.), is the second edition, revised and brought up to the newer views of science, of a book which created some attention when it first appeared some years ago. Practically it is quite a different volume to what it was then, when the disturbing theory of evolution was either unknown or ignored. Dr. Radcliffe is an opponent of evolution, and although not a prejudiced one, we cannot help feeling he has not taken sufficient pains to fully understand it. Apart from this we have read his book with sincere pleasure and profit. It most thoughtfully and reverently discusses the many-changing varieties of Nature, physical, animal, and vegetable; and dry facts and their relations light up with the glow of the author's genius. The literary style is of the most attractive character, not demonstratively fervid, but chaste and yet enthusiastic.

"Physiography," by Professor Huxley, F.R.S. (London, Macmillan & Co.), will be hailed with pleasure by science students. Although we do not like the new name with which the South Kensington authorities have replaced the older one of Physical Geography, Professor Huxley shows us in this handsome and well got-up volume how natural phenomena may be studied in the concrete, even in their relation to our earth, in a wider and deeper sense, perhaps, than was undertaken in the science of physical geography. The author eschews the old system of treatment in works on physical geography, wherein the readers were *first* taught about the shape and motions of the earth, &c., and begins just at the other end, leaving such astronomical facts to be discussed last. The river *Thames*, in fact, is employed as a sort of scientific text, and Professor Huxley makes its relations and associations the groundwork of a general description which will answer almost equally well for any other river and river-valley in the world. The plan is admirably worked out, as we might reasonably expect it would be at the hands of such a master.

"The Origin of the World," by Dr. J. W. Dawson (London, Hodder & Stoughton). Dr. Dawson is well-known as an ardent field geologist, and one who has largely and successfully contributed to the vast storehouse of geological knowledge. Unfortunately he appears to us to be an equally ardent theologian; and so, when he writes books on geology in general (and he always writes them well and attractively), he cannot forget the theological bayonets against which the stony science has been repeatedly impelled. The consequence is a *mélange* of geology and theology, which we are afraid is not of special advantage to

either. Especially is Dr. Dawson angered with the theory of evolution, and he loses not an opportunity to tilt against it, frequently with as much success as Don Quixote's similar attempt to overthrow the windmills. The present volume is especially saturated with what Professor Huxley calls "Mosaism"; one almost feels as if we had gone back to the time of Hugh Miller. But there are many readers who are fond of discussing the many points of contact which still exist between Genesis and geology; and to such we can confidently recommend Dr. Dawson's book as likely to please them in no ordinary degree.

"Accidents in Mines: their Causes and Prevention," by Alan Bagot, Mining Engineer (London, C. Kegan, Paul, & Co.). In this small but attractive volume the author has collected all the information possible, as seen by those who are engaged professionally as mining engineers, in order to its being brought before the public. He discusses whether the principles of Davey's Safety-Lamp hold good when the atmospheric pressure is as great as we find it in deep coal-mines. Also, what effect the vibrating waves of sound may have on the flame within the lamp when the latter is surrounded by an explosive mixture of gas. Mr. Bagot thinks that in the solution of these two problems lies the secret of explosion after shot-firing in mines. In the eighteen chapters which compose this book, the author enters most fully into the economy of coal-mines, and all that concerns their safe and effective working. The work is therefore a most valuable one, and ought to be in the hands of all those whom the subject directly or indirectly concerns.

A REMARKABLE GARDEN PLANT.

(*Thunbergia alata*.)

THIS very pretty tropical climber, belonging to the natural order *Acanthaceæ*, a native of India and Madagascar, was introduced to our gardens some fifty years ago. It presents in the structure of its flowers numerous points of interest. The plant is a slender twiner, with hastate leaves, whose petioles, as the specific name *alata* implies, are broadly winged. The calyx is very minute, consisting of twelve hair-like sepals, its place being occupied by two large membranous, almost transparent, bracts. These are strongly keeled, and overlap each other, completely enveloping the calyx, and about one-half of the corolla tube. Besides the keel, there are about six well-marked longitudinal veins, connected by numerous smaller ones almost at right angles, forming a rectangular network somewhat resembling that of *Ouvriandra fenestralis*. The whole surface is beset with scattered hairs, which are either simple, or with one or two septa, and bent where the septum occurs. They are hollow, except at the nodes and near the points, the hollow portion terminating in a bulbous

expansion similar to a nettle-sting. There is but little chlorophyll, a large portion of the bract being occupied by air-spaces, into which numerous long, narrow stomata open. The corolla is salver-shaped, slightly oblique, and of a clear Nankeen yellow, the colour being somewhat brighter round the throat. In some forms the throat is a dark chocolate-brown, almost black, while in one variety the limb is pure white with a dark throat. The stamens are four in number, and are situated far down in the tube of the corolla, the interior pair being considerably shorter than the exterior pair. The filament is inserted into the dorsal portion of the connective, a short distance from the base of the anther, thus giving the ventral face of the anther a slight inclination forwards and upwards.

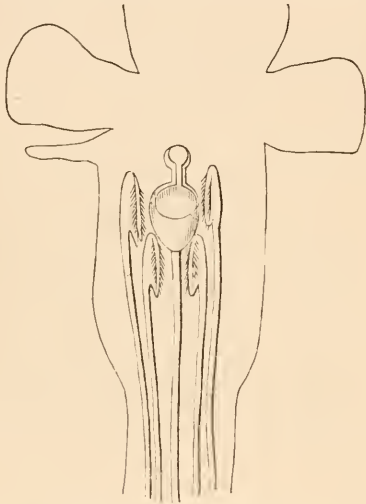


Fig. 45. Diagram of flower of *Thunbergia alata* (vertical section).

The anthers adhere by the ventral suture, the projecting margins of the lobes being densely bearded with hairs of a peculiar and interesting form. They are slender and clavate, consisting of numerous joints. The lower are oblong, three or four times as long as broad. Proceeding from the base upwards, the joints become shorter, thicker, and more rounded, and with deeper constrictions, giving a beaded appearance, the uppermost one being frequently divided by vertical septa into two or three. These topmost cells are some twice or thrice the diameter of what I may term the stem of the hair, the whole of which, from base to summit, is finely tuberculated, the tubercles increasing in number and size from below upwards. A trace of this tuberculation occurs also on the hairs of the bract, but to a very much smaller degree. The pollen, which, like the anthers and the anther hairs, is almost white, is spherical, and has several broad, flat, spiral grooves winding round it in opposite directions, producing a very curious appearance. The pistil is long and slender, passes up between the interior and shorter pair of stamens, and, like them, is closely

addressed to the back of the corolla tube. The stigma, which is situated a short distance above the upper stamens, appears to consist of two parts. The upper portion is the style slightly flattened and curved round into a kind of a narrow funnel, at the base of which, and on the front of the style, is a semicircular cup-shaped body, which seems to be a further development of the stigma, as I have observed numerous pollen-grains adhering to its viscid edges. The concave surface of this cup is upwards, the convex downwards. Thus it appears that every precaution is taken to avoid self-fertilization. The corolla is almost erect,

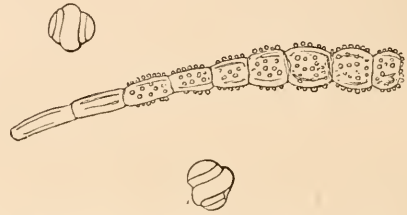


Fig. 46. Anther-hair and pollen-grains of *Thunbergia* $\times 200$.

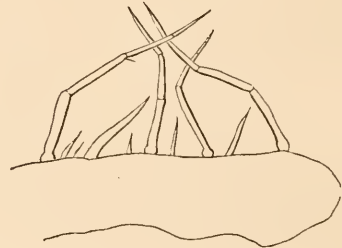


Fig. 47. Hairs of bract of *Thunbergia* $\times 50$.

the stamens densely bearded on the ventral or front side, with hairs pointing downwards, which hairs, still further to retain the pollen from any accidental disturbance from wind, &c., are club-shaped, thickened at the apex, and closely tuberculated, while the pollen-grains themselves have spiral grooves to increase their tenacity to the hairs. Again, the stigmatic surface is turned directly away from the pollen, so that it is scarcely conceivable that self-fertilization could take place. Suppose an insect with a long proboscis visits the flower, its proboscis passes downwards freely to the base of the corolla; on withdrawing it, the trunk cannot fail to brush upwards or backwards some of the anther hairs, and in so doing set free some of the pollen which adheres. The horizontal and non-stigmatic portion of the pistil being downwards, receives none of the pollen. The insect visits another flower, and thrusts its proboscis, laden with pollen, into the corolla. In so doing, the stigma being in a narrow portion of the tube, is nearly certain to intercept some of the grains, and thus ensure fertilization. Even should this fail, touching the base of the style causes it to bend forward, and thus be ready for the next comer. The

truth of this is readily proved, for flowers which are "set" artificially freely produce seed, while those left to themselves, being grown under glass, and thus out of the reach of most insects, never come to maturity. The seed-vessel is somewhat curious, as well as other parts of the plant, being in shape a flattened sphere with a long beak, and contains two to four hemispherical rough blackish seeds. Altogether, whether as botanical curiosity, or a garden ornament, this *Thunbergia* is well worth growing.

GREENWOOD PIM, M.A., F.L.S.

THE POTATO-BEETLE.

IN thanking Mr. W. V. Andrews, the Corresponding Secretary of the Long Island Entomologists' Society, U.S.A., for his kind and complimentary allusions to myself on page I of the present volume, I am reluctantly compelled, as he classes me "in the ranks of the alarmists," to conclude either (1) that I have, in my article on the Beetle in question, in *SCIENCE-GOSSIP* of 1st September last, acted unwittingly upon the principle that language is given us to conceal our thoughts; or, (2) that Mr. Andrews does not thoroughly understand the English tongue. There is some slight excuse for the first hypothesis in my remarks upon South Kensington on p. 202; and it is humiliating to have to point out, even to an outsider, that these were "written sarkastic," as the great Artemus says. For the second one, I must refer to my express statement, on p. 203, that "to the writer it seems that our much damper and colder climate, not affording opportunities for the rapid succession of broods which the insect develops in America, must materially militate against its obtaining a permanent hold; and the collateral arguments, that no American beetle has ever established itself in England, and that we possess no near ally of this particular one, cannot fail to have some weight in the matter." The fact is, that to every Coleopterist of my acquaintance, and to every one (the name is legion) with whom I have had conversation on the subject, it is well known that I have from the first steadily and strenuously been opposed to any belief in the idea that the potato-beetle could be of any harm in this country; and this view I have always upheld in everything I have written. Indeed, I have a firm conviction that, if circumstances had not prevented the present Editor of *SCIENCE-GOSSIP* (long may he reign!) from attending the Plymouth meeting of the British Association, where there was much talk, post-prandial and otherwise, upon this subject, the false conclusion as to my being among the alarmists would never have appeared—at all events, without simultaneous correction.

Mr. Andrews says:—"Mr. Rye tells you that Paris green is a favourite remedy here, but he does not understand the American mode of doing things.

Some State entomologist or other probably had a friend in the oil or colour business," &c., and, "You do not do things in that way in honest old England, but we do here." Without going so far as to quote a homely Saxon proverb, concerning a certain ill bird and its nest, I must, remembering Riley, Le Baron, Packard, Cyrus Thomas, and other "good men and true," of whose scientific help the U.S. Government has wisely availed itself, energetically disclaim the acceptance of such remarks as these as a sample of the "SCIENCE-GOSSIP" of the States. It is to the first-named of these authorities that we owe most of our knowledge of Transatlantic economic entomology; and his reputation is far too securely established to be shaken by the insinuations of even the Corresponding Secretary of the Long Island Entomologists' Society. That gentleman's concluding caution to English readers, that all striped beetles found on potatoes are not Colorado beetles, but may be useful little fellows, &c., shows an ignorance of our Insect Fauna, remarkable in one who proposes to allay our (hypothetical) fears.

E. C. RYE.

NOTES FROM WEST KERRY.

ONLY a few species of *Cetacea* are known to frequent the Irish coast; the common porpoise is of every-day occurrence; the pilot-whale (*Globiocephalus Svineval*) is often met with in large numbers, and an immense *Balena* is occasionally cast on shore. All the smaller species of *Cetacea* are termed "Porpoises" by the Irish peasantry, who value them, not only as excellent food, but attribute to their flesh and oil hygienic and medicinal properties. Consequently, whenever one or more happen to be stranded, they rush in crowds with scythes and sickles, hatchets, pitchforks, spades, knives, and all manner of deadly weapons, to the scene of the occurrence, hew, hack, decapitate, and cut into fragments the unwieldy stranger, and long before rumour of the capture has reached any educated person, the coveted flesh is stored away in tubs, or piled in a corner of some sooty cabin; the entrails and useless *viscera* thrown into the receding tide or torn by hogs (the dear and cherished associates in Irish cabins of scrofulous children and of their filthy parents), and so far as science is concerned the unfortunate fish, seal, or cetacean, might as well have remained in his marine abode. On a March morning in 1864, on the shelving sandy beach of Fermoyle, skirting the waters of Brandon Bay, on the west coast of Kerry, I observed two men moving a heavy object, which on closer inspection proved to be part of the head of a cetacean such as I had never before seen. The head had been much larger, and divided vertically behind the eyes; the front portion only remained; the eyes, however, were left untouched, as also the lunated spiracle, with the concavity looking forward.

The measurements in the recent state of the animal were—

From centre of fold of spiracle to each eye, 10 in.

From same point to extremity of *upper* jaw, 22 in.

From commissure of lips to extremity of upper jaw, 13½ in.

From same to extremity of lower jaw, 14 in.

On the lower surface of the integuments corresponding to the space between the *rami* of the lower jaw, was a well-defined angle, formed by two depressed lines, or furrows, each ten inches long. These lines converged to an apex in front, while their extremities behind were seven inches apart. The acute angle thus defined corresponded, I say, externally with an almost equal internal angle, formed by the convergence of the lower jawbones, and giving accommodation to the deep pouch of the pharynx, as shown in my illustration. With the kind assistance of my friend, Mr. R. Conway Hickson, whose finely-placed residence at Fermoy is in the immediate vicinity of the scene of capture, the remains of the head were rescued from the destroyers and conveyed to Carth Gregory, a neighbouring village, where scientific appliances are scarcely more numerous than “strawberries grown in the sea.” However, under unfavourable circumstances four or five photographic illustrations were obtained from it—not artistic, certainly, but affording correct ideas, for the first time, I believe, of the physiognomy of the curious creature. Eagerly, as you may suppose, and at once, I consulted the few authorities within my reach, and found that this remarkable cetacean had not been previously recognised as a visitant of the Irish coast, nor of Great Britain, save once before, in 1790. In Jardine’s “Naturalists’ Library” it is described and figured as DIODON SOWERBII, but the Plate there given has little resemblance to the animal, and none as regards the beak, its most conspicuous peculiarity. It is described, though not figured, in the “English Cyclopædia, as “ZIPHIIUS SOWERBII,” and that is now its recognised appellation.

The genus “ZIPHIIUS” is remarkable chiefly for its elongated jaws, which extend to, at least, a length of fourteen inches from the commissure of the lips, and form a beak or snout of great solidity and strength. The upper fits into the lower as a cylinder into a semi-cylinder. Before the lower jaws converge to form this semi-cylinder, and posterior to the point where the front of the pharyngeal pouch is attached to the bone, *one* stout pyramidal tooth is inserted in a deep socket on each side of the lower jaw; thus the tooth is nine or ten inches from the extremity of the beak. The soft parts on the upper jaw are notched on each side for the reception of the high projecting tooth; these teeth are believed to be characteristic of the male. Though found in the Scotch and Irish animals, there are a few specimens in Continental museums from which they are absent; this absence was supposed by some to indicate difference

of *species*, by others to be merely a *sexual* distinction. The genus *Ziphius* is comparatively new to Natural History. Nothing was known of it till some fossil remains were sent from Holland and from the south of France to Cuvier, who, not being then aware of any existing cetacean with similar beak, supposed the remains to belong to an *extinct* genus. The discovery in Scotland, in 1790, proved that this supposition was erroneous, and a very few living specimens met with since have shown that *Ziphius* does exist in modern seas. Still they are extremely rare, and an unutilised specimen would be of great anatomical interest, and its skeleton a *desideratum* in any museum.

In 1870, after a lapse of six years, it was my fortune, alone of all men, I believe, to meet with a second *Ziphius*, about five or six miles from the site of the first capture. This time the animal came in near Brandon Pier, a very interesting and well-known fishing-station, worthy of more remark than would be relevant here.

Before I saw it, it had been treated like its predecessor; its flesh had been cut into a thousand pieces by the greedy peasantry, and its bones unscientifically sawn and broken. I snatched a portion of its jaw from a dog’s mouth, and disinterred parts of the split skull from a dungheap; and I dragged some portion of the skeleton, as well as part of the stomach which pigs had not torn, from the ebbing tide. The intestines generally were so mangled as to be useless for anatomical purposes; nor could any part of the solid viscera be obtained. An irregular hole, whose largest diameter may have been an inch, had been made in one compartment of the stomach, which I had taken from the tide-covered sand, and this compartment was completely filled with sand. I do not think it probable, or even possible, that the sand could have entered through the accidental aperture while for a short time under water. I cannot offer any explanation of *how* or *why* it was there; but who will affirm, in our total ignorance of the habits of the animal, that he did not swallow it during life, impelled by some unaccountable physiological necessity, or perhaps from depraved appetite, the result of disease? I opened what seemed to be a second compartment of the stomach, when more than a pint of bile rushed out. Anatomists have denied a gall-bladder to zoophagous cetaceans, but what was this?—or is *ziphius* not zoophagous? Nothing but sand and bile existed in these viscera; I was *much* pressed for time, and could not examine more closely into the matter, but sent both stomach and bile to Dublin to competent investigators.

Ziphius No. 2 was about seventeen or eighteen feet long, and was first observed on the beach at high water, in great uneasiness, floundering, and, of course, working a cavity in the sand, in which it remained when the tide had ebbed. When first approached by its butchers it was seen to open its cylindrical jaws in a portentous way, and to close them with an

angry snap, while from each tooth stood out laterally two or three large barnacles, giving it a wild and extraordinary appearance. Of these cirripedes only parts of the peduncles remained when I got possession, but, as the captors said, they were not common barnacles (*Lepas Anatifera*), so well known to all dwellers on the sea-coast; I am inclined to believe they were another well-known species (*Conchoderma Aurita*). The presence of these barnacles seems to discountenance an opinion which some might rashly entertain, that the sharp strong teeth, if not confined to the male, were used to impale the animals' prey, while being crushed by the powerful beak; but if such were the case, the impudent and daring guests would be rubbed off before they could become firmly fixed to their strange abode, so close to the maw of their monstrous host. On the other hand, the extremely sharp point of the tooth would seem to indicate constant use. As to the colour of the animal, the skin on the head of the Fermoyle specimen was of a glossy satiny black, badly represented in the photograph, owing to the reflection of light, but I cannot now speak with certainty of the mouths proper and the tongue. In the Brandon Pier specimen I cannot speak of the head, but the deep pharyngeal pouch was of the usual reddish colour of mucous membrane. I obtained a few square pieces with the natural skin, not torn or gnawed, black and glossy, but vermicularly marked with white streaks, up and down and across, in irregular network. Many of the "streaks bore a singular resemblance to old cicatrices—scars from greedy marine warriors, inflicted, perhaps, by grampuses or sharks. Though I will vouch for it that Ziphium himself, if angry or jealous, could give a sharp nip to an enemy or rival, yet I do not believe that these teeth were given for attack or defence; if fixed at the *point* of the beak, they would be powerful instruments for either species of warfare. One of the spectators asserts, that when first stranded, the unhappy animal "roared like a bull." Another insists that he was perfectly silent. In this, as in almost every case, I would be inclined to believe the less sensational witness.

A recital of the synonyms applied to our long-beaked friend—ungallantly assuming that the toothless specimens are the females—would fail to interest your readers. *Diodon*, *Physeter*, *Delphinorynchus*, *Mesodiodon*, *Dioplodon*, *Mesoplodon*, are a few of the jaw-breaking epithets, dangerous to any jaw less mighty than its own! "ZIPHIOUS SOWERBII," like Aaron's Rod, has swallowed the others.

My friend, Mr. William Andrews, the zealous and learned naturalist who has done so much for Irish Natural History, and especially for that of West Kerry, has given them all, and much information besides, in an excellent paper read to the "Royal Irish Academy," descriptive of Brandon Ziphium No. 1, to which I may refer all readers for information beyond the scope of my "gossip."

I placed the few fragments of skeleton No. 1 at the disposal of Lord Ventry, and of No. 2 at the disposal of Mr. Andrews, and I believe they are now in the museum of the "Royal Dublin Society."

J. W. BUSTEED.

THE SEALS AND WHALES OF THE BRITISH SEAS.

No. VIII.

By THOMAS SOUTHWELL, F.Z.S., &c.

ONE more British Ziphoid is known, SOWERBY'S WHALE (*Mesoplodon Sowerbiensis*, De Blainville); it was first described from a specimen which came ashore at Brodie, Elginshire, in 1800, and has since been found three times in Ireland; there is also a skull in the Museum of Science and Art at Edinburgh which belonged to a specimen believed to have been captured somewhere on the Scotch coast; the remains of five others are preserved in various Continental museums.

Of the individual which came on shore on the coast of Kerry, in March, 1864, Mr. Andrews has given a description in the "Transactions of the Royal Irish Academy," for April, 1867. Fortunately it came under the notice of Dr. Busteed, of Castle Gregory, who being interested in zoology, and aware of the great importance of the occurrence, photographed the head in several positions while it was yet fresh: Dr. Busteed's photographs were reproduced in the Transactions of the Royal Irish Academy. The head had unfortunately been removed immediately behind the frontal portion of the skull, the base of which is lost, as also the other parts of the skeleton. The total length of the animal was about fifteen feet, the two teeth largely developed and projecting like the tusks of a boar; these teeth are believed to be developed only in the males. On the under part of the throat the V-shaped furrow was very conspicuous. Sowerby's specimen was coloured black above, and nearly white below. The skin smooth like satin. "Immediately under the cuticle the sides were completely covered with white vermicular streaks in every direction, which at a little distance appeared like irregular cuts with a sharp instrument."

The remaining family, *Delphinida*, as has been said, is a very numerous one, it has ten representatives in the British fauna, contained in seven genera, the first of which, according to the arrangement I have adopted, is that of *Monodon*. The NARWHAL (*Monodon monoceros*, Linn.) is a native of the Polar seas, seldom leaving the ice; stragglers have occurred three times on the British coast, one in 1648 in the Firth of Forth, another came ashore alive at Boston, in 1800; the third was taken in Shetland in 1808. This species is very numerous in the frozen seas to the north of latitude 65°, and is remarkable

for the enormous development of the left canine tooth, which is projected forward in the form of a tusk or a spear, reaching to the length of six or eight feet. The spear is of fine compact ivory, hollow for the greater part of its length, grooved spirally along its outer surface, but smooth at the end, and bluntly pointed. The right canine is rarely developed, but a few examples have occurred in which both tusks were present (see Proc. Zool. Soc., 1871); the female is rarely furnished with this appendage. Not long since I saw preserved in a country mansion, the tusk of a Narwhal measuring 7 ft. 5 in. long; it was carefully kept in a long case resembling a barber's pole,

tusk, which is frequently found in a broken condition, is used for purposes of attack and defence. The Narwhal is very social in its habits, great numbers being often met with together; its food consists of cuttle-fish and crustaceans. The length of the full-grown animal is about 16 feet, the upper parts gray, the sides and belly white, and the whole animal spotted with black and gray. The only authentic figure of the Narwhal with which I am acquainted is that given by Scoresby; this is so well known from frequent reproduction that it is not necessary to give it here.

The WHITE WHALE, or BELUGA (*Delphinapterus*

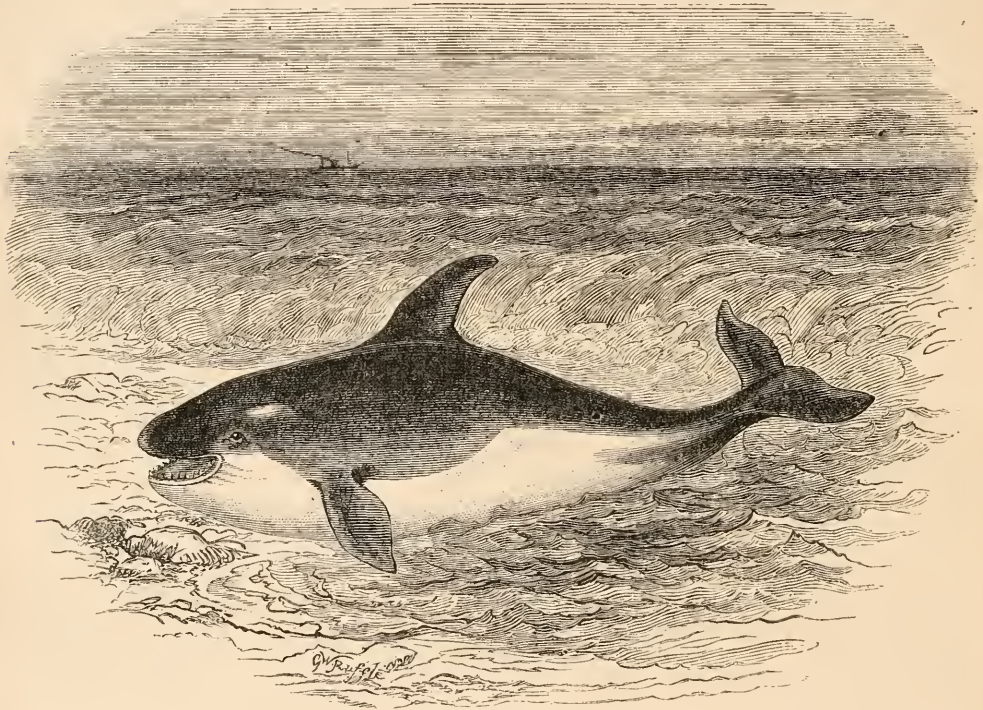


Fig. 48. The Grampus (*Orca gladiator*, Lacép.).

and bore a ticket attached, which stated that it was "Bequeathed in 1561 by the Countess of ———, to her daughter ———." The use of this remarkable appendage appears very doubtful; it has been conjectured that it serves to stir up food from the bottom of the sea, in which case the female would be badly off without it; or that it is employed to keep breathing-holes open in the ice, and an instance is related in support of this view, in which hundreds were seen at an ice-hole protruding their heads to breathe, but it is not clear whether they made the hole for themselves, or whether they were attracted by it, particularly as there were numbers of White Whales with them. It seems certain, however, that the

Lucas, Pallas), like the preceding species is a native of the Polar seas, where it is common; it is abundant in the White and Kara Seas and in the Gulf of Obi; on the coast of Norway it is occasionally met with; and in our own seas has occurred several times, but must be regarded only as an accidental straggler. On the east coast of America it is found as far south as the Gulf of St. Lawrence, where, as in the White Sea, it delights in ascending the mouths of large rivers. In the British Association Report on the Fauna of Devonshire (1869, pp. 84 and 85), occurs the following passage. "Mr. P. H. Gosse writes:—"On August 5th, 1832, I was returning from Newfoundland to England, and was sailing

up the British Channel close to the land, when just off Berry Head, I saw under the ship's bows a large cetacean of a milky-white hue, but appearing slightly tinged with green from the intervening stratum of clear water. It was about 16 ft. long, with a round, bluff head. It continued to swim along before the vessel's head, a few yards beneath the surface, for about ten minutes, maintaining our rate of speed, which was five knots an hour, all which time I enjoyed from the bowsprit a very good view of it. It could have been no other than the White Whale, the *B. borealis* of Lesson.* The whale lately exhibited at the Westminster Aquarium belonged to this species; unfortunately it did not live to equal in docility and intelligence a specimen exhibited in

kill great numbers, extracting the oil and drying the flesh for winter use; in Russia, the prepared skin is much used for reins or other parts of harness requiring great strength and lightness. The length of the full-grown animal is about 16 ft., and its food consists of fishes, Crustacea, and Cephalopods.

The common GRAMPUS or KILLER (*Orca gladiator*, Lacépède), (fig. 48) is a well-known and widely dispersed species, being found in both the North Atlantic and Pacific Seas. Andrew Murray says "the common Grampus tumbles through the heavy waves all the way from Britain to Japan, *viâ* the North-west Passage." In the British seas it is frequently met with, and has occurred in several instances on the coast of Norfolk. This species is very fierce, its appetite insatiable, and

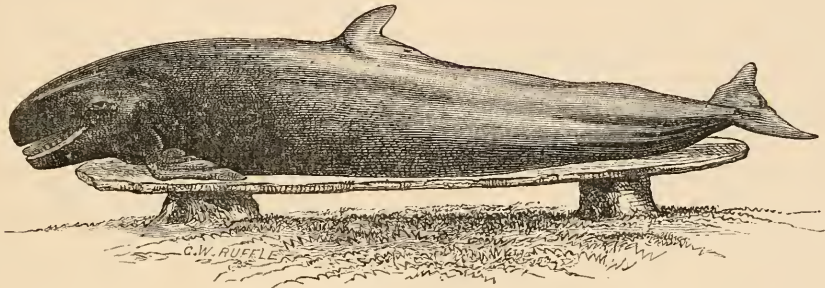


Fig. 49. *Pseudorca crassidens* (Reinhardt).

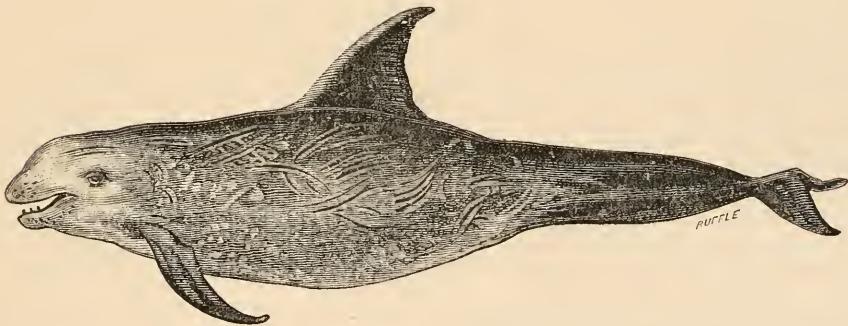


Fig. 50. Risso's Dolphin (*Grampus griseus*, G. Cuv.).

America, which "learned to recognise his keeper and would allow himself to be handled by him, and at the proper time would come and put his head out of the water to receive the harness" by which he was attached to a car in which he drew a young lady round the tank,—or to take his food. A specimen of *Delphinus tursio* which was for a time with him in the same tank, is said to have been even more docile than this remarkable animal.* The adult Beluga is pure white, and a "school" of these animals "leaping and playing in the calm, dark sea," is said to be a very beautiful sight. In summer the Greenlanders

carnivorous in the strictest sense of the word; to the Greenland and White Whale, as well as to porpoises and seals, it is an implacable enemy, and follows them ruthlessly. Dr. Brown says, "the White Whale and seals often run ashore, in terror of this cetacean, and I have seen seals spring out of the water when pursued by it. The whalers hate to see it, for its arrival is the signal for every whale to leave that portion of the ice." Eshricht took out of the stomach of a Killer, 21 ft. long, which came ashore in Jutland, no less than thirteen common porpoises and fourteen seals.

The rounded, compact form of this species gives the idea of great strength and swiftness, and the beautifully

* Ann. and Mag. Nat. Hist., 3rd series, vol. 17, p. 312.

polished glossy black skin of the back contrasting with the equally pure and well defined white of the lower parts has a very striking effect; altogether it is a very handsome species, but there is something in its appearance which seems to indicate its cruel nature. The adult Killer measures about 21 ft. in length, the back is pure black, the under parts white, and over the eye is a well-defined white spot; there are thirteen or fourteen strong, slightly curved teeth on either side of both jaws; the flippers are broad and oval shaped, the dorsal fin high, particularly in the male.

As these papers are intended for the purpose of assisting in the identification of casual visitants to our shores rather than of giving anything like a history of the known British species of Cetacea, it may be desirable to mention here a very remarkable form, which although it has never been known to occur in the flesh on our shores, was first made known to science from an imperfect skeleton found in a semi-fossil condition beneath the peat in a Lincolnshire Fen. To this Dolphin "come back as it were, from the dead," and which forms a connecting link between the genus *Orca* and the genera *Grampus* and *Globicephalus* (and which Owen had named *Phocæna crassidens*), Reinhardt gives the name of *Pseudorca crassidens*. On the 24th November, 1861, a large shoal of these dolphins made their appearance in the Bay of Kiel, about thirty of which the sailors succeeded in separating from the remainder, but all, with one exception, escaped. This was a female 16-feet long, which after being exhibited at Kiel and other places, was bought for the collection of the University of Kiel. In the summer of 1862, three other individuals, presumably from the same shoal, were thrown ashore on the north-western coast of Zealand. Of the general appearance of this creature the accompanying figure (49), copied, by kind permission, from Professor Flower's translation of Reinhardt's paper read before the Royal Danish Society of Sciences in 1862, and published by the Ray Society, will give an idea; the figure is from a photograph of the Kiel specimen, and is not in the original paper. The length is from 16 to 19 feet; of the colour no account is given, but judging from the woodcut of the Kiel specimen it appears to be uniformly shiny black. The number of teeth differs in individuals, but in this one it was from 9 to 10 on either side of the lower jaw, and 8 to 10 in the upper. From the observations made by Reinhardt, he suggests the possibility that there may be "a difference in the sizes of the different sexes, and whether the females are not larger, but at the same time, perhaps, provided with a head comparatively smaller than that of the males." It is very suggestive of how little we know of the inhabitants of the sea, that at least one vast shoal of a species known only from its sub-fossil remains should be roaming the seas only to be accidentally discovered when its members became entangled

in shoals from which probably many never lived to extricate themselves.

RISSE'S DOLPHIN (*Grampus griseus*, G. Cuvier) is a rare and little known species, which has been met with four times on the south coast of England and about eight times in France. In the "Transactions of the Zoological Society," for 1871, Prof. Flower gives an account of an adult female which was taken in a mackerel-net, near the Eddystone Lighthouse, on 28th February, 1870, and which eventually was sent up to London, when it was seen and described by that gentleman. About a month later, a second specimen was received in London, the precise locality of which was not known, but it was probably from somewhere in the Channel. This was also a female, but a very young animal, and as the adult female first taken had recently given birth to a young one, it is quite possible that it may have belonged to her. On the 26th July, a male of the same species was captured alive at Sidlesham, near Chichester, and sent to the Brighton Aquarium, where it lived only a few hours.

Risso's Dolphin varies very considerably in its colouration. The Sidlesham specimen was bluish-black above, and dirty white beneath; in the adult female described by Professor Flower (from whose illustration our figure is, with his permission, copied), "the head and the whole of the body anterior to the dorsal fin was of a lightish grey, variegated with patches of both darker and whiter hue. . . . Behind the anterior edge of the dorsal fin the general colour of the surface, including the dorsal and caudal fins, was nearly black, though with a large light patch on the upper part of the side directly above the pudendal orifice. The middle of the belly as far back as the pudendal orifice, was greyish white."* The most remarkable characteristic however, was the presence, scattered over the body, of irregular light streaks and spots, these markings extended from the head to within about two feet from the tail and presented a most singular appearance. In the young one the upper parts and sides of the body were almost black, the lower parts nearly white, the junction between the two colours being very abrupt and sharp. "On either side the body were six vertical whitish stripes nearly symmetrically arranged, and almost equidistant, being about six inches apart. They did not extend quite to the middle line of the body above, and were lost below in the light colour of the abdomen."† The length of the Sidlesham male was 8 feet, that of the adult female 10 ft. 6 in.; in the former there were present four teeth on each side the lower jaw, in the latter three only on each side, and in the immature specimen there were present seven teeth, four on the right, and three on the left side, the teeth are always placed in the front part of the mandible, and in every specimen exa-

* Trans. Zool. Soc., vol. viii., p. 3.
† l. c. p. 13.

mined there has been an entire absence of teeth in the upper jaw. In general appearance, Risso's Dolphin, more particularly the dark-coloured specimens, is said very much to resemble the next species (*Globicephalus melas*). Of its habits and distribution nothing positive is known, but from its visiting France or England in the spring or summer. M. Fischer "concludes that this species is migratory, visiting the shores of Europe in the summer, and passing the winter either to the south towards the coast of Africa, or to the west towards the American Continent."*

MICROSCOPY.

VOLVOX GLOBATOR.—It may be interesting to Microscopists to know that *Volvox Globator* can be found in considerable numbers—although so early in the year—in the large pond near Wandsworth Common Station. On Wednesday, Jan. 23rd, the Superintendent of the Sunday School here gave a treat to the children, and we arranged to make it both interesting and instructive. Having undertaken the Microscopic department, I was examining a bottle of fishings from the pond, and was surprised to find it contained *Volvox* in great plenty. To find it so early being quite new to me, I have inquired of several friends, but none of them had met with it at this time. Most of them seem to have imagined that it was useless to expect to find it till about the end of March. It may be that many others have not found it for the same reason; and a knowledge of the fact of its being obtainable now may be an addition to the Microscopist's pleasures. While examining a portion of the gathering, we were particularly struck with a fine specimen, containing no less than ten small ones enclosed. It rolled round with a motion so grand, that all who saw it were delighted. Suddenly, while watching it, it stopped for a moment, and then burst. Five of the little ones escaped from the parental envelope. There was a distinct pause between their liberation, and each came out with a sort of dizzy staggering movement, and then, after a momentary rest, would start off and commence to roll as if quite an old hand at doing it. The other five seemed to die, and make no sign. — *W. Winsford, Upper Tooting.*

CLEANSING OLD SLIDES.—In my paragraph on this subject, which appeared in the January number of SCIENCE-GOSSIP, p. 15, at line 4, instead of "water-glass," read "watch-glass." In line 7 put a full stop at "Benzole," and instead of "and use," read "I use."—*John Bramhall.*

IMPROVEMENT IN MICROSCOPE-STANDS.—Mr. George E. Fell, of Buffalo, has recently suggested a new addition to the microscope-stand. It consists

of a finely-engraved scale on that part of the body of the stand which sides the limb. The latter can be furnished with a vernier, giving readings as close as may be desired.

PLANT-CRYSTALS.—At the last meeting of the East Kent Natural History Society, numerous drawings were exhibited of *Raphides*, and other microscopic plant-crystals, intended to be engraved on two plates of more than forty figures. They were the work of Prof. Gulliver, F.R.S., who gave explanatory observations thereon. Among these was the curious and novel description, that some trees and other plants, from stem to branches and leaves, are invested by a most delicate network, or tessellated pavement like mosaic work, of cells all studded with *sphaeraphides*, so that each cell is set and adorned with a gem of one of these beautiful crystals. *Aralia spinosa* was said to form an example, beneath its bark or epidermis, of this external skeleton of crystalline tissue. And an internal crystalline skeleton was shown in other plants, including some *Leguminosæ*, as may be well seen in the common white clover; the crystals being arranged in chains along the vascular bundles. Mr. Gulliver remarked that boiling a portion of the plant, before its examination, in the solution of caustic potash which is kept by druggists, exposes the crystals very clearly. He added that he had learned that Mr. Hammond, of Milton Chapel, had found the long crystal prisms of *Iridacæ*, &c., admirably suited for experiments on the polarization of light; and that the whole subject of plant-crystals belongs to the vast domain of the cell-biography of plants, hitherto sadly neglected, but which must be diligently cultivated before we can hope for the most complete system of botanical classification, and knowledge of the laws which govern the vegetable kingdom.

HABIRSHAW'S CATALOGUE OF THE DIATOMACEÆ.—Mr. Frederick Habirshaw, of 6, West Forty-eighth Street, New York, to whom I am personally unknown, has kindly sent me a copy of the above work, which supplies a want long felt by diatomists. To explain its plan and intention I cannot do better than quote the short preface. "The following Catalogue, made for private use, contains the references to the literature of the *Diatomacæ*, published prior to May, 1877. At the suggestion of Prof. Hamilton L. Smith, of Hobart College, fifty copies have been reproduced by the Edison electrical pen process, for gratuitous distribution among those specially interested in this branch of natural history, and I trust the errors or omissions will not be found sufficient to impair the value of the Catalogue." The volume is a convenient quarto, 11 in. x 6 in., of some 270 pages, the first six containing a list of the principal writings relating to the *diatomacæ*, the rest being devoted to the general catalogue. The genera and species are arranged alphabetically, and

* 1. c. p. 18.

there must be considerably over 7,000 species enumerated, to each of which short but copious references are attached, as to where it may be found figured or described, the synonyms being also given. As far as I have been able as yet to verify these, they seem quite correct. Those who have been fortunate enough to receive a copy will, of course, show it to their friends, who will wish to obtain one also, and I fancy Mr. Habirshaw will be induced to print off a much larger edition, though, of course, not gratuitously, to supply the demand.—*Fred. H. Lang, Torquay.*

MICROSCOPIC LIFE OF THE CARBONIFEROUS LIMESTONE.—At the last meeting of the Chester Society of Natural History, Mr. G. W. Shrubsole, F.G.S., read a lengthy and interesting paper on "The Microscopic Life of the Mountain Limestone (*foramenifera, radiolaria, entomostraca, polyzoa, &c.*)." The various objects described had been chiefly obtained from the mountain limestone of North Wales and the neighbourhood.

ZOOLOGY.

TURNING AN ENEMY TO USE.—The United States Entomological Commission, which was organized for the purpose of investigating and reporting on the entire subject of insect ravages throughout the western regions of the United States, have discovered, by means of chemical analysis, that dead locusts will furnish a new oil, which will be christened *caloptine*, and a very large percentage of pure formic acid. Though this acid exists in the ant and some other insects, it is with difficulty obtained in large quantities; whereas, by the action of sulphuric acid upon the locust juices, it passes off with great readiness and in remarkable quantity and gravity. The uses of this acid, as a therapeutic, are capable of great and valuable extension, where it can be obtained so readily and in such quantity.

THE RED-THROATED DIVER.—When visiting in Shetland two years ago, I had a capital opportunity of witnessing the nesting of the Red-throated Diver (*Colymbus septentrionalis*). Having been informed by a Shetlander that the aforesaid bird had frequented a certain loch the previous year, I was determined to walk over thither, a distance of about six miles. Accordingly I set out, but, in crossing the mountains, encountered a very heavy shower of rain, which continued for the space of about an hour; nevertheless I succeeded in seeing the object of my expedition. When on the summit of a mountain near my journey's end, I descried the loch, and also the Diver swimming leisurely about. This, however, proved to be the male, for, on walking round the margin of the loch, I saw the female sitting on her nest with out-

stretched neck. She permitted me to approach within about four yards of her. When I had stood for five or six minutes to admire her beauty, she suddenly dived from the nest, and all my efforts to see her afterwards were unavailing. The nest was nothing more than a slightly hollow depression on the very edge of the loch, and contained but one egg, of a more elongated form than usual, of a dark brown colour, sparingly spotted with black.—*C. D. Wolstenholme.*

RARE BIRDS SHOT.—Lately there have been the following rare birds shot:—A Merlin (*Falco Esalon*), shot near Wetherby on the 16th December, 1877; a Bittern (*Botaurus stellaris*), shot at Castle Howard, on the 26th of the same month; and a Pied Water Rail (*Rallus aquaticus*), shot in Ireland in January, 1878. The latter has a great quantity of white on the back; the top of the head and neck have also a little white about them. There is a little white on the tail, and the tertials are nearly pure white.—*P. Thompson.*

ST. MARY, LAMBETH, FIELD CLUB.—This most useful and unostentatious Natural History Society was originated about six years ago by the Sunday School teachers of the parish, who have been very successful in diffusing and popularising a love of natural history. It includes about thirty members, of whom Arthur Eve, Esq., is president, and Mr. G. Masters secretary.

THE BIRDS OF COSTA RICA.—At a recent meeting of the Zoological Society of London, Mr. A. Boucard, C.M.Z.S., read a paper, in which he gave a list of the birds he had collected during a recent expedition to Costa Rica. The number of birds collected during his five months' stay was about one thousand in number, representing two hundred and fifty species, amongst which were two new to science (*Zonotrichia boucardi* and *Sapphironia boucardi* of Mulsant) and many others of great rarity.

"SPONSA'S HEADQUARTERS."—I find I made two mistakes in my article. They both occur in the list of *Diurni* at the end of the article:—*Aglaja* should be omitted; and, for *Artaxerxes*, of course *Agestis* should be put. At the time I wrote the paper I was much occupied with *Artaxerxes*, and suspect that was the reason of the mistake.—*Hastings C. Dent.*

BOTANY.

THE INFLORESCENCE OF GOURDS.—The gratification which I feel at the interest excited by my note on the inflorescence of gourds and pumpkins is tempered with regret at finding that I did not express myself with sufficient clearness to be understood by your correspondents, who seem to think that I had said that fertile blossoms were expanded before any staminate flowers had appeared on the same plant;

which indeed was not my meaning. My observations do not at all contradict those of Mr. Beal. What I notice as remarkable is this:—In regular indefinite inflorescence, when a flower appears in the axil of every leaf, the flower in the axil of the lowest leaf is the oldest, and therefore opens first; then, that in the axil of the leaf next above it; and so on, as in the pimpernel. In gourds and pumpkins, this order of expansion is observed only among flowers of the same sex. Suppose, then, that a plant bear ten flowers, the first nine of them may be staminate flowers, the tenth, pistillate. If a flower open every day, as is usual in our climate, the fertile flower would not open in the ordinary course till the tenth day. Instead of that, however, it will be found expanded on the fifth and sixth; it may be simultaneously with one of the staminate flowers or not, but always before the staminate flower immediately below it. Flowers of the two sexes, though indiscriminately mixed as to position on the stem, thus form two series as to the order of their expansion. I think that there are usually more staminate flowers produced early in the season, and a tendency afterwards to the production of pistillate flowers which are abortive for want of vigour in the plant to perfect them. I only remember one instance of a gourd producing a fruit blossom too early in the season to be fertilized: it was a miniature gourd, which produced a fruit, as the result of that blossom, with no seed.—*John Gibbs, Chelmsford.*

ASPLENIUM SEPTENTRIONALE AND GERMANICUM.—About ten years ago I found *Asplenium septentrionale* in the Beddgelert district. There were a great many plants growing within a limited area, but the spot was very difficult of access, and it was, perhaps, owing to this that they had escaped observation. I brought away four or five specimens, and took fronds from some other plants, but they were all *septentrionale*. I did not look specially for *Germanicum*, certainly, but, as far as my observation went, there was not a plant of it there. At the same time I quite agree with the observer whose opinion Mr. T. Belt quotes, that a very close relationship exists between these two species.—*Edward Hart Vinen, M.D.*

GENTIANA ACAULIS.—In the Autumn of 1875, I was staying, after illness, at the Freshwater Hotel, Isle of Wight, and, during my first ramble over the Downs, I gathered two species of *Gentiana*, which I sent to my friend Mr. Varenne, of Kelvedon, who has a fine collection of British plants, and is a first-rate botanist. After reading the communication in your last, about the appearance of *Gentiana acaulis* in that locality, I wrote to Mr. Varenne to let me know what species I sent him, and I enclose his answer:—“Dear Dr. Bree, I am much afraid the lady who wrote in SCIENCE-GOSSIP made a mistake about the *Gentiana acaulis* in the Isle of Wight. You collected two specimens of gentian there, in September, 1875,

as forwarded to me. One was a stunted state of *Gentiana Amarella*, and the other, equally dwarf, was a specimen of *Gentiana campestris*, probably. Both are many-flowered, and by that character very different from *Gentiana acaulis*.—*E. G. Varenne.*”—*Dr. Bree.*

GENTIANA ACAULIS.—I would beg to remind your correspondent, “J. C. M.,” with reference to some remarks inserted in your recent issue, that the flowering of plants vastly depends upon *climatal influences*. There is no reason because *G. acaulis* blossoms on the Swiss Alps towards the middle of June till July, that therefore it should flower here at that time; the conditions are totally dissimilar. Many years ago I noticed several blossoms of this lovely plant, in a friend's garden in East Sussex, during the month of September. It has been stated that “Alpine flowers are signalized by the intensity of their colours, this increase of brilliancy in tints being attributed to the pure snow-water nourishing the roots, to the greater excitement of the light, and refined purity of the air.” Not only so, there are other forces at work which should cause an earlier floral development. They get a longer and more persistent rest in winter, and protection from the carpet or blanket of snow. During my travels in Italy, in February and March of 1865, vegetation appeared to be most backward; but on my return home by Florence, in early April, the vegetable world was in full luxuriance of leaf and beauty. Whilst journeying over the Mont Cenis pass, numerous flowers were in full bloom, some peeping through patches of snow, others in places where it had melted. Nothing of the kind existed out of doors in England. If indeed *G. acaulis* blossoms with us in June and July, as it is said to do on the Alps during those months, the remarks by Treviranus, quoted by Dr. Lindley in his “Theory and Practice of Horticulture,” might hold good:—“It is well known that plants from the northern half of the world, when they have become naturalized in the south, have changed almost entirely the time of their vegetating, blooming, and fruit-bearing, so as entirely to accord with the habits of the indigenous plants of the country. Thus we find at the Cape of Good Hope oaks, alders, almond, peach, and apricot are in full bloom in August.” Our best botanists, such as Mr. Bentham, I believe, maintain that *G. acaulis* is not indigenous here; so it might obey the dictum as laid down by Treviranus.—*John Colebrook.*

GENTIANA ACAULIS (S. G. 1878, p. 18).—I hope your fair correspondent, Isabella H. Knox, will not be offended if I tell her in your pages that *Gentiana acaulis* is not found wild in the Isle of Wight, and that the plants she found between the Needles and Freshwater were not Gentians at all, but dwarfed specimens of *Campanula glomerata*. There can be no doubt about it. Bromfield, in his “Flora Vic-

tensis," says of the plant, "on Freshwater Downs in various places, as near the Needles Hotel and Light-house, but scarcely an inch high, being browsed down by sheep"; and he further adds in a note at p. 291, "On the bleak and lofty Downs, at the western extremity of the island, this species scarcely attains an inch in height, and specimens from thence were actually described and figured by Withering ("Arrangement of British Plants," 3rd ed. ii p. 282, and pl. xi., fig. 5) as a new species of *Gentian*, and named by him *G. collina*." I. H. K. may therefore console herself that others before her have been deceived by the same plant at the same place.—*Wm. Marshall, Ely.*

SIDE LIGHTS ON THE COMPOSITÆ.—A most suggestive paper on this subject appears in the last number of the *Journal of Botany* by Dr. Masters. It is based on a specimen of *Helonenium autumnale*, in which all the florets appeared stalked and bearing opposite leaves on the stalks, the whole forming a corymb of flowers instead of the ordinary capitulum of a composite.

BRITISH MARINE ALGÆ.—Mr. H. Goole (Plymouth) desires us to correct a few mistakes which appeared in his communication on the above subject in our last issue, p. 40. For instance, instead of *Dasya punicea* it should be *D. punicea*; for *Dudresinia dudresnagra* there should have been *Dudresnaia dudresnagra*.

GEOLOGY.

IMPORTANT PAPER ON THE GEOLOGY OF WESTERN SCOTLAND.—At a recent meeting of the Geological Society of London, Prof. Judd, F.R.S., read a most important and highly interesting paper on Scottish geology. During the seven years in which he has been engaged in the study of these interesting deposits, the author has been able to prove that not only is the Jurassic system very completely represented in the Western Highlands, but that associated with it are other deposits representing the Carboniferous, Poikilitic (Permian and Trias) and Cretaceous deposits, the existence of which in this area had not hitherto been suspected; and by piecing together all the fragments of evidence, he is enabled to show that they belong to a great series of formations, of which the total maximum thickness could have been little, if anything, short of a mile. The relations of the scattered patches of Mesozoic strata to the older and newer formations respectively, are of the most interesting and often startling character. Sometimes the secondary rocks are found to have been let down by faults, which have placed them, thousands of feet below their original situations, in the midst of more ancient masses of much harder character. More usually they are found to be buried under many

hundreds, or even thousands, of feet of Tertiary lavas, or are seen to have been caught up and enclosed between great intrusive rock-masses belonging to the same period as the superincumbent volcanic rocks. Occasionally the only evidence which can be obtained concerning them is derived from fragments originally torn from the sides of Tertiary volcanic vents, and now found buried in the ruined cinder-cones which mark the sites of those vents. In some cases the mineral characters of the strata have been greatly altered, while their fossils have been occasionally wholly obliterated by the action of these same igneous forces during Tertiary times. In every case, the survival to the present day of the patches of Secondary rocks can be shown to be due to a combination of most remarkable accidents; and a study of the distribution of the fragments shows that the formations to which they belong originally covered an area having a length of 120 miles from N. to S., and a breadth of 50 miles from E. to W. But it is impossible to doubt the former continuity of these secondary deposits of the Hebrides with those of Sutherland to the north-east, with those of Antrim to the south, and with those of England to the south-east. From the present positions of the isolated fragments of the Mesozoic rocks, and after a careful study of the causes to which they have owed their escape from total removal by denudation, the author concludes that the greater portion of the British Islands must have once been covered with thousands of feet of secondary deposits. Hence it appears that an enormous amount of denudation has gone on in the Highlands during Tertiary times, and that the present features of the area must have been, speaking geologically, of comparatively recent production—most of them, indeed, appearing to be referable to the Pliocene epoch. The alternation of estuarine with marine conditions, which had, on a former occasion, been proved to constitute so marked a feature in the Jurassic deposits of the Eastern Highlands, is now shown to be almost equally striking in the Western area; and it is moreover pointed out that the same evidence of the proximity of an old shore-line is exhibited by the series of Cretaceous strata in the West. Although the comparison and correlation of the Secondary strata of the Highlands with those of other areas, and the discussion of the questions of ancient Physical Geography thereby suggested, are reserved for the fourth and concluding part of his memoir, Prof. Judd took the opportunity of making reference to several problems on which the phenomena now described appear to throw important light. In opposition to a recent speculation, which would bring into actual continuity the present bed of the Atlantic and the old Chalk strata of our island, he points to the estuarine strata of the Hebrides, as demonstrating the presence of land in that area during the Cretaceous epoch. He also remarks on the singular agreement of the conditions of deposition

of both the Silurian and Cretaceous strata of the Scottish Highlands and those of the North American Continent. But he more especially insists on the proofs, which we now have, that the Highlands of Scotland, as well as the greater part of the remainder of the British Islands, were once covered by great deposits of Secondary strata, and that the area has been subjected to enormous and oft-repeated denudation. He dwells on the evidence of the vast quantities of material which have been removed subsequently to the Mesozoic and even to the Miocene period, and he maintains the conclusion that many, if not all, of the great surface-features of the Highlands must have been produced during the very latest division of the Tertiary epoch, namely the Pliocene.

THE FOSSIL FUNGUS.—I have frequently observed that, in being called upon to answer criticisms of my work, I have more commonly to reply to statements I have never made (or even thought of) than to defend the position I have really taken. In your January number (p. 21) P. Martin Duncan combats the idea that *Peronosporites* "is perhaps the oldest fungus on record." I have never made any such statement, so I need not reply. Your correspondent then quotes instances of *Algæ* being found in older rocks than the Palæozoic, but as my description refers to a fungus, and not to an alga, the instances brought forward by P. M. Duncan, though of the greatest value and interest, refer rather to true *algæ* than fungi, *i.e.*, if the distinguishing characters between the two, and now generally received, are to hold good. The letter in your February number (p. 41), signed "John Butterworth, Goats Shaw, Oldham," is of a very different character, and hardly demands an answer. This gentleman writes to "dispute" my "claim to its discovery," because he "discovered" it (*i.e.*, the *Peronosporites*), and read a paper upon it (at Manchester) which was not published. Now, I have never set myself up as the "discoverer" of the fossil fungus; I claim to be nothing more than the humble drudge who pored over the fungus preparation for some weeks, made out the structure of the mycelium and fruit, its affinity with living plants, and then attempted a description and illustration. If J. Butterworth did all this in 1874-5, I regret, with him, that some permanent record was not made of his work "in some leading journal." In my paper I distinctly stated that Mr. W. Carruthers, F.R.S., the Keeper of the Botanical Department of the British Museum, was the "discoverer" of the plant, as he certainly was—and something more. The parasite has been known by this gentleman for many years. J. Butterworth states that a member of his Society identified his fungus "as *Peronosporites*" in 1874-5. How this learned "member" did so, I am at a loss to know, as *no such genus as Peronosporites existed* before last year, when the name was given by me to the parasite in question. I have certainly had something more

than a "casual" view of the slide, as I have had it in my own house for six months, and have it now.—*Worthington G. Smith.*

THE FOSSIL FISHES OF SUSSEX.—At a recent meeting of the Eastbourne Natural History Society, Dr. Ward read a paper on "The Fossil Fishes of the District." They are met with chiefly in the Upper and Lower Chalk strata of the Downs at Holiwell; others in the Greensand and Gault; and a few in the Wealden beds. Dr. Ward's paper was illustrated by specimens.

NOTES AND QUERIES.

THE IMPORTATION OF HUMBLE BEES INTO NEW ZEALAND.—Perhaps some of your correspondents could give some valuable hints as to the best method of importing humble bees into New Zealand. The farmers there are anxious to introduce them, as they are said to be necessary for the successful cultivation of clover, which they aid by carrying about the pollen. An attempt was made, I understand, to bring over a number of the insects, but they all died on the way, and it has now been proposed to bring over the eggs. But if, as I believe, the larvæ are hatched in cells, and fed by the parent bees until entering the pupa-state, this idea would not seem to promise better success than the former. Could the perfect insects be transported in a torpid state? Or would it be possible to naturalize them by introducing the pupæ? I hope some practical solution of the question may be given by some contributor.—*Charles B. Moffat.*

CRAYFISH IN CUMBERLAND.—Some of the small runners into Croglin Water, a tributary of the Eden, abound with crayfish. I had many opportunities of seeing them last spring. The inhabitants of the district have a legend that the "crabfish" were introduced by some member of the Featherstonhaugh family, but so long ago that I could gather no precise information as to the date. I think it improbable that they are indigenous, but not knowing anything of their geographical distribution, I shall be glad of any information on the subject.—*W. Duckworth, Grey-street, Carlisle.*

NATTERJACK TOAD ON THE SHORES OF THE SOLWAY FIRTH.—While staying at Bowness on Solway in August last, I found quite a colony of the Natterjack. On one part of the shore, where the ground was damp, nearly every stone of moderate size I turned up had a natterjack below, sometimes two. There was no mistaking it, the yellow line down the back being ample means of identification. It would be interesting to know if ever it has occurred thus far north before, as I was under the impression that it belonged only to the east and south of England.—*W. Duckworth, Grey-street, Carlisle.*

THE PIGEON A POLYGAMIST.—In Mr. Dixon's interesting account of the pairing instinct of birds, he says, "I have once observed the rook practising polygamous propensities. We have a pigeon of the 'horseman' variety which is a confirmed polygamist. I observed this during the course of last summer repeatedly." Is this peculiarity in the pigeon known to ornithologists as a common or uncommon occurrence? Does this present to view an inherited energy, or only applicable to the surrounding circumstances?—*M. King.*

QUERY RESPECTING SEA-ANEMONES. — Sea-Anemones, like other animals, require to “be fed.” But, unlike most other domestic animals, this need not be done daily. Once a week will do in most cases, though some like it oftener; but if it fouls the water more harm than good will accrue to the animals by over-feeding. No doubt they derive some nourishment from organisms in the water, but these should be microscopical, and not perceptible, *i. e.*, the water should *even be sparklingly clear and colourless*; if not, there is something wrong. Find out the cause of this, and set it right without changing it: time and patience alone will often effect this. Or it may be aerated or circulated without changing. In no case change it, unless it has become chemically poisonous. Organic impurities can always be got rid of by oxygenation, or a process known as cremacausis, or burning up. Thus, living animals give out carbonic acid gas, and certain effects of food, which, if allowed to accumulate, generate carburetted or sulphuretted hydrogen. But living plants take up these poisonous gases (assimilate the carbon to build up their tissues), thereby rendering them harmless, and liberate the free oxygen again for the animals to breathe. This goes on ceaselessly under the action of light, and this balance of animal and vegetable life is the grand governing principle of all aquaria, great or small. If W. T. H. C. Trome wishes to keep a scientific aquarium, he will remember this, and *never change the water*. He will thus be able to keep his animals more happily, healthily, and easily. But the anemones must be fed. Mussel or oyster flesh is best, handed to each individual by a pair of wooden forceps, in pieces varying in size from a pin’s head upwards, say, to a quarter of a mussel, according to the size of the anemone; experience will soon show how much. Under proper conditions this is nearly all assimilated. If it is rejected, perhaps the pieces are too large, or the water too hot or too cold, or the animals too crowded,—most probably the latter with beginners. The thing is to find out how many animals will live and flourish in a given space: keep these and no more. If oysters or mussels or fish cannot be easily procured for food, butcher’s meat will do, but not so well. Much depends upon the *distribution* of the water. The smaller the depth in proportion to the size of the animals the better; because the greater the surface aëration, and, as oxygen is perpetually wanted for the animals to breathe, and to purify the water, the more regular the supply the better. This may be accelerated by stirring in air, say, with the stick of a camel’s hair pencil, this may be done daily, especially so the day after feeding, to prevent or dissipate any cloudiness in the water. The brush at the other end will be useful to pick up any refuse bits, and skim off the mucus which otherwise collects round the base of most anemones, and would in a state of nature be washed away and dissipated by the waves. We collect them into a cup of water, and throw them away, and thus prevent the accumulation of untidiness, in small domestic aquaria of still water. In large aquaria, as at the Crystal Palace, impurities are dissipated by a ceaseless flow of water from tank to tank, down to the underground reservoir, to be pumped up again fresh and clear for ever; and I know of no cheaper or better guide than the sixpenny and twopenny handbook to this successful institution; but if W. T. H. C. Trome will state his aquarium dimensions and difficulties, we may be able to tell him more in SCIENCE GOSSIP. Hardy anemones are about the easiest animals to begin with. Ours live and flourish, year after year, in shallow tanks, or glasses, commercially known as “anemone pans,”

or pastry pans. In all cases growing plants cannot be dispensed with, and *spontaneous vegetation* is found best, because best suited to each separate situation. To prevent this growing to excess, and causing the water to become green, avoid too much direct daylight, by using blinds or screens. Blue paper will sometimes serve sufficiently. —G. S.

BOTANICAL LOCALITIES. —The following is a fairly accurate description of the localities inquired for by Mr. H. Morton, in the January number of SCIENCE GOSSIP:—Shotover Hill is $2\frac{1}{2}$ miles E. of Oxford; Cowley is a village not far from the latter place, 2 miles S.E. of Oxford; Bagley Wood lies $2\frac{1}{2}$ miles to the S. of Oxford and 3 N. of Abingdon; Wychwood Forest (Winchwood being apparently a misprint) lies 14 or 15 miles to the N.W. of Oxford (nearest station, Charlbury, on the Oxford and Worcester line); Cornbury Park is situated at the N.E. corner of Wychwood Forest, and half a mile S. of Charlbury station. I have been unable to discover the exact situation of Cornbury Quarry, but presume it must be in the immediate neighbourhood of the Park. Sunninghill Wells is in the extreme S.E. corner of Berks., 6 miles S.S.W. of Windsor, 6 W. of Egham, $7\frac{1}{2}$ E. of Wokingham, and nearly a mile from Ascot station. Most of these places are, as Mr. Morton says, good localities for plants (I know nothing about insects), and he may perhaps be interested to know what plants may be found there. The following are the names of a few, which I give partly from my own observation, partly from “Walker’s Oxfordshire Flora.” Shotover Hill, *Polemonium æeruleum*, *Drosera rotundifolia*, *Gentiana Amarella*, *G. campestris*, *Trifolium subterraneum*, *Habenaria bifolia*, *H. viridis*, *Epipactis palustris*, *Cephalanthera grandiflora*; Cowley, *Geranium rotundifolia*, *Pinguicula vulgaris*, *Anagallis ærulea*, *A. tenella*, *Fritillaria meleagris*, *Orchis conopsea*; Cowley Bog is also very rich in *Scirpi*, *Carex*, &c.; Bagley Wood, *Iris fetidissima*, *Convallaria majalis*, *Luzula congesta*, *Neottia nidus-avis*; Wychwood Forest, *Asperula cynanchica*, *Atropa Belladonna*, *Orchis pyramidalis*. If Mr. Morton wishes to learn more about the good botanical localities in this neighbourhood, I shall be very happy to correspond with him.—H. W. Trott, 24, Walton-street, Oxford.

ENTOMOLOGICAL AND BOTANICAL LOCALITIES. —(Reply to H. Morton.) (Winchwood should be Wychwood; Sunninghill Wells should be Sunningwell Hill.) Four of the places inquired for are within a short distance of Oxford—say two to four miles. Shotover and Cowley are on the Oxfordshire side of the Thames valley; Sunningwell and Bagley Wood on the Berkshire side. Shotover may be reached by rail to Wheatley, whence a pleasant walk of five miles over the hill to Oxford. Sunningwell and Bagley form part of an ironsand range of hills bounding the Thames valley, between Abingdon and Oxford, and are easily accessible from Radley station. Cornbury Park and Wychwood Forest adjoin Charlbury station on the West Midland line, about twenty minutes’ ride per rail from Oxford.—E. C. Davey, Wantage.

FAIRY FLAX (No. 158, p. 44), and *Fairy Lint*, are names which, according to Johnston, in his “Botany of the Eastern Borders,” are given in the border-land to *Linum catharticum*, L. The district comprehends “Berwickshire, the Liberties of Berwick, N. Durham, and the immediately adjacent parts of Northumberland and Roxburghshire.” I should think the name, “Fairy Flax,” is given to this

pretty little plant merely from its delicate appearance, being, in fact, a miniature or fairy imitation of the common flax in everything but the colour of the flowers. Still there may be some legend connecting it with the fairies, and, if so, I shall be much obliged to any correspondent who can furnish me with any folklore of Fairy Flax illustrative of its name or otherwise. "E. L. S." may be interested to know its other English names, though, as far as I am aware, it has fewer than most British plants. Gerard calls it *Mill Mountaine*, which Prior, in his "Popular Names of British Plants," derives from the Lat. *Cha-melinum montanum*, Gr., *χαμα-λινον*, Ground-Flax. In Cumberland, Shropshire, and Cheshire it is called *Mountain Flax*, being frequent in hilly and mountainous districts; and in the latter county it is also known as *Purging Flax*, a translation of its scientific name, or *vice versa*, and it is so called from its reputed cathartic properties. In Cheshire, however, I have found that herb-doctors are not very particular what the effects of a herb may be, so long as it is a herb, and they generally administer it as a stomachic on account of its bitter taste.—*Robert Holland.*

THE NEBULAR THEORY.—It has been discovered by M. Cailletet, and M. Raoul Pictet that our air can produce water; they have also converted oxygen and nitrogen into liquids, and have produced a vapoury cloud from hydrogen, under great pressure and excessive cold. Under the nebular hypothesis of Laplace, the origin of water is nowhere satisfactorily accounted for. Mr. Proctor has told us that it is to all intents and purposes demonstrated that the nucleus of this earth was formed from a nebulous condition. The German astronomer, Gruithuisen, adopting the same primary condition, formed this earth by the slow aggregation of cold matter, leaving the water origin unaccounted for. By this new discovery, it seems that all the conditions for producing the water were present under the latter system. The light and heat had not penetrated the nebula; there was therefore intense cold, as there is now in the air above us and at the sea-bottom. As the solids of the nebula slowly condensed, they caused great pressure. As the gases are expressed now in water from the earth, so we may infer that they were at the beginning. In *The Mail* of January 9th, 1878, I find, "It is only a question of carrying these experiments further in order to reduce these liquid gases to the solid form." We have then a nebulous mass filling the whole space now occupied by the atmosphere, the water, and the solid earth. Under the universal law of gravitation, the heaviest molecules of the mass subsided towards their centre—as these molecules condensed, they produced pressure. Hence we have the result in our quasi-solid earth, the water resting on it, and the air enveloping the whole, the entire system resulting naturally from the nebulous mass, the sunlight and heat reducing or refining the atmosphere to its present condition by causes well known.—*H. P. Mallet, S, Via Venezia, Florence.*

HAREBELL (No. 158, p. 47).—There are two good reasons why this name should not be derived from the hairlike stalks upon which the flowers hang. The first is that the spelling "Hairbell" is of comparatively modern introduction, inasmuch as the older writers, such as Gerard and Parkinson, spelled it "Harebell," though it must be confessed that the spelling of the older herbalists does not go for very much. The second reason is that when those old writers do make use of the name, they are not speaking of *Campanula rotundifolia*, but of *Scilla nutans*. When the name was transferred in books from *Scilla* to *Campanula* I am not aware. Some choose to spell

the word "Airbell," from the supposition that it refers to the colour of the flowers being similar to the air or sky; but the same objections apply to this also—the first does, at any rate. As a matter of fact, however, the name Harebell or Hairbell is not the name in most general use, except in books, for either plant. In fourteen different stations in England and Scotland I only have Hare—or Hairbell recorded for *Campanula* in three, viz., Yorkshire, Cheshire, and the West of England; and in twenty-five counties I have the name applied to *Scilla* in but one, Devonshire. Lyte is, I think, the oldest writer who gives an English name to *C. rotundifolia*, and he calls it "Blewbelles," which is still one of its commoner names, but which is also as often given to *Scilla*. It would seem, then, that *Scilla nutans* is the original "Harebell"; that it was "hare," not "hair"; that the name has been transferred to *Campanula rotundifolia*, and the spelling altered in some cases in order to account for the name, because its stalks are delicate and hairlike. I do not possess a copy of Gerard to refer to, but it is possible he may say why *Scilla* is called "Harebell."—*Robert Holland.*

PAIRING INSTINCT OF BIRDS.—As to the question of birds using the nests of other species, and why not of the same species? It will invariably be found that the selected nests are old ones, and belong to birds who only once use them for their purpose. In the case of the House Sparrow using the nest of the Martin, the bird has utilized it for its purpose, in the absence of the Martins, and, upon their return, keeps possession of the nest by "force of arms," and consequently compels the rightful owners to build elsewhere. I may also mention that sparrows may be found breeding the year throughout, and retain their old nests in many, if not all cases. There is a stately fir-tree in my neighbourhood containing several sparrows' nests. They have been there for several years, and I have not the least doubt but they have been tenanted by the same pairs of birds, as the nests are always equal in numbers, and should one of the nests be destroyed, it will again be built in a more inaccessible situation. Now, if birds used the nests of their own species indiscriminately, their ranks would be fraught with strife and discord, which I have, as yet, failed to observe. All birds would consequently strive to obtain an old nest, rather than be at the trouble of constructing one for themselves; fierce combats would prevail, and then, no doubt, the "survival of the fittest" would in one sense be correct. Again, all birds work as influenced by their respective instincts. The Martin, having once constructed its abode, remains, through the agency of instinct, at rest, as far as nest-building is concerned, until that structure is damaged, or forcibly taken from it, as in the case of the sparrow, when it must repair its handiwork, or make new quarters elsewhere, if not able to repel the aggressor. How can we explain, except through this peculiar instinct, the annual return of the same number of birds, and the little wanderers alighting upon their temporary homes shortly after their arrival; or, if their nests have been destroyed, clinging to the old sites, and, as the breeding season arrives, constructing new nests on the ruins of the old ones? A word as to the circumstance mentioned by your correspondent, "G. T. B." I have no doubt that he is quite correct in believing that the pair of blackbirds laying in the same nest three successive years is one and the same pair. But did not the nest undergo repairs? I have never known a nest of this bird, however compactly built, be fit for its purpose again, even the next season, let alone three successive seasons.

However, as no such instance has come under my own observation, I decline making further remarks on such instance. The blackbird pairing with the song-thrush, if correct, is no doubt a very exceptional occurrence, and can only be explained as a monstrosity, which this, and all similar instances, undoubtedly are, and which, however unexplainable, are repeatedly found in various birds and animals. I will also mention the fact, that the pairing of annual birds is not so closely linked with the vernal year as is currently supposed. The hedge-sparrow, through what I have observed, invariably pairs late in December. A few weeks prior to that date the birds are solitary; they gradually become more social, and very garrulous; and now, at the time of writing this, all specimens seen are invariably in pairs. I think Mr. Parsons somewhat mistakes my object in saying, "the only way is by polygamy." I do not for a moment entertain the idea that *all* birds could multiply quickly by practising it, but only those which I have stated (first section of gallinaceous birds), and for what that gentleman brought forward the human race as examples, bearing on the present subject, I am at a loss to imagine. As to polygamy occurring in species under domestication, I ask why the domestic swan (*C. olor*) remains in a strictly monogamous state for life, although, in many cases, the males must be in the minority. I have known a case where three of these birds were kept (two females and one male). Now, the male bird paired with one of the females and remained united to her, and never bestowed any of his affections upon the more unfortunate female. Ducks always show a polygamous instinct when in confinement, if the females do *not* exceed the males. Again, the domestic pigeon, though the females may far exceed the males, a polygamous instinct will never be manifested, the male birds pairing in due season, and assisting to rear their offspring with as much care as the female birds. It must also be remembered that the males of polygamous birds are invariably of bright, if not conspicuous colours, while the females closely resemble the colours of surrounding objects. The males, too, are the best eaters, invariably the largest, and consequently the most liable to capture, and the most prized as articles of food; while the females are more often rejected, or never discovered in their haunts. It will thus be seen that the females would exceed the males, and did no such polygamous instinct exist within them, circumstances the most disastrous would arise with deadly certainty to their race. Thus, I again say, that through one of the wisest provisions of nature, these birds are able to afford us sustenance, and at the same time maintain their position amongst their congeners in the struggle for existence.—*Charles Dixon, Heeley, near Sheffield.*

THE PAIRING INSTINCTS OF BIRDS.—Seeing something in January part of SCIENCE-GOSSIP, about the pairing instinct of birds, I thought the following might be interesting. About April of last year I had a brood of chickens, and amongst them I reared one duck. When they grew old enough I killed all the cocks except one, for which one the duck has shown a strange attachment, following it all about. The cock has reciprocated and continued this *sexual* attachment, showing a decided preference for the duck over the hens. I have, unfortunately, lost the duck, but the night before, the cock, instead of going up to roost beside the hens, as it generally did, slept on the ground beside the duck. It is impossible now to say what would have been the result of their attachment; but perhaps some of your readers would

say whether they have observed the like.—*John Baillie, Sunderland.*

HERRINGS.—Can any of your numerous readers inform me, what are the signs by which some fishermen know where large bodies of herrings are swimming, even when their boats are sailing rapidly through the water?—*J. W.*

DREDGING.—Would some of your correspondents be so kind as to give me some information on dredging not far from the shore, also as to what books would be useful in determining the objects I am likely to find?—*R. G. C.*

CURIOUS MODES OF BLOSSOMING.—I have in my garden here a Rhododendron which grows near the house, and is sheltered by it from the south and west, but has no shelter from the north or east. For the last three years it has blossomed about this time of the year (January). There have been several flowers this year, but all on the same side of the tree, and near together. Last year they were on the other side, towards the house, and were a little earlier (at Christmas), and less numerous, but this year there is no shelter whatever from the north and east. The flowers are a beautiful pink, like the flowers on the same tree in the summer. There is also a yellow jasmine, which grows in the drawing-room balcony, now in blossom, and neither of these plants has any sun during the winter, and not much in the summer, owing to their position.—*L. T.*

CAVES IN SOMERSETSHIRE.—Nearly all that is known of these caves is summarised in Mr. H. B. Woodward's "Memoir on the Geology of East Somerset, and the Bristol Coalfield," published in 1876 by the Geological Survey; but as "Somersetia" and other readers of SCIENCE-GOSSIP may not have access to such expensive luxuries as Survey Memoirs, I venture to offer a brief epitome of the subject. The Lamb Cavern near East Harptree is now closed. It seems to have been artificial, but was fully described in Collinson's "History of Somerset" (1711). In Burrington Combe are several caverns, four of which, viz., Aveline's Hole, Plumley's Den, Whitcombe's Hole, and the Great Goatchurch Cavern in Lower Twinbrook Ravine, were explored by Professor Boyd Dawkins and Mr. W. A. Sandford. (Geol. Mag. vol. ii. p. 43; Rep. Brit. Assoc., 1864; Proc. Somerset Arch. and Nat. Hist. Soc., part ii., vol. xii. p. 161.) They obtained remains of sheep, ox, reindeer, roe-deer, ibex, goat, mammoth, bear, water-vole, wolf, fox, badger, rabbit, hare, pig, mole, birds, and, in Aveline's and Whitcombe's Holes, of man. The human bones encrusted with stalagmite were evidently buried. There are, or were, also caves in the Carboniferous Limestone at Weston-super-Mare, Loxton, the western end of Banwell Hill, and near Hutton. At Uphill there are caves in the same formation, in which remains of mammoth, deer, rhinoceros, wolf, ox, horse, bear, otter, pig, hyæna, fox, polecat, water-vole, mouse, birds, and man, have been found. (Pooley, Geologist, vol. vi. p. 331; E. C. H. Day, Geol. Mag., vol. iii. p. 118; W. W. Stoddart, Proc. Bristol Nat. Soc., vol. v. p. 37.) There are several caverns at Cheddar, but Cox's is, though not large, perhaps the most beautiful in England from its stalactites. Bones of bear, deer, ox, horse, and man, were recorded from a cave on the summit of the Mendips here, by Mr. Long, in 1838. (Brit. Assoc. Rep. 1838, p. 85.) Wookey Hole, near Wells, more correctly spelt Okey (from British *o*, a cave), is only second to the Peak Cavern in Derbyshire in point of size, being nearly six hundred feet long, and, in one

part, eighty feet high. It is in the Dolomitic Conglomerate of the Trias. Messrs. Dawkins and Sandford found here bones of hyena, lion, bear, wolf, fox, mammoth, two species of rhinoceros, horse, Irish deer, red deer and reindeer, and human implements of flint, chert, and bone, of contemporary date. (Dawkins, Q. J. G. S., vol. xviii. p. 115; vol. xix. p. 260, P. Proc. Somerset Arch. and Nat. Hist. Soc., vol. xi., part ii., pp. 197-219; and Geol. Mag., vol. ii. p. 44.)—*G. S. Boulger.*

THE FURNITURE BEETLE.—I can mention another instance of destruction to furniture by the "furniture-beetle." Two years ago I found them working and living in the frame of a sofa that has been about thirty years in my possession. The sofa was taken out of the house, and during three days was frequently brushed with very strong carbohc acid. Last week I examined it, and found fresh borings of this pest. The sofa has a beechwood frame, 1 in. thick and faced with mahogany half-inch thick. The insects have not touched the mahogany, but in many places have bored close up to it. I am now having the beechwood removed, and mahogany substituted. Can anything be devised (short of destroying the wood) that would kill these destructive insects? I fear that their habits render liquid applications unable to touch them or their eggs.—*T. Hughes.*

THE FRESHWATER AQUARIUM.—Scarcely a number of SCIENCE-GOSSIP appears but contains queries or notes on the above subject; and, judging from some of these queries and the replies to them, aquarium-keeping on a small scale would appear to the tyro an extremely difficult task. We are told ("Ben Plant," July, 1877) to limit the plants to three species, molluscs to two, and reptiles to exclude entirely. Others have complained of sticklebacks eating all their snails, and of killing each other. My own opinion is that there is nothing in connection with practical natural history involving less trouble than aquarium-keeping. In giving this opinion, it is true that it is not the result of so many years' experience as some of your correspondents can boast, but it is based upon seven or eight years' successful work. With regard to the vessel which is to constitute the aquarium, I believe this to be of minor importance, and that, so far as the inhabitants are concerned, a washing-tub will serve as well as an elaborately constructed plate-glass tank, though, of course, the latter is the best adapted for observation. I think the chief charm (and use also) of an aquarium lies in the fact that we see various creatures living under natural conditions. To make the conditions as natural as possible, I would introduce most of the inhabitants of an ordinary pond; the exceptions would be only such species as prey inordinately upon the others. Such, as the aquatic coleoptera and hemiptera, and the larvæ of dragon-flies. I would admit all the pond gasteropods; the two species of newts (*cristatus* and *punctatus*), and I certainly have not found it necessary to limit the species of plants. The larvæ of the caddis-flies are interesting and amusing, and I certainly cannot agree with "S." as to the difficulty of rearing them to their final stage. The aquarium must have walls, and as the caddis-worms have legs, they can therefore have no difficulty in reaching the surface. It is no uncommon thing, at the proper season, to see several escaped caddis-flies hovering about my aquarium. "P. E. C." is troubled because the sticklebacks eat his snails. His best plan would be to feed the fish with small worms, until the snails have had time to increase in number; this they will soon do at such a rate as will defy the most voracious stickleback.

Difficulties of this kind only occur at starting; things soon right themselves, and the "balance of power" is maintained. "S." thinks sticklebacks are the most troublesome inmates of an aquarium. I would substitute "interesting" in place of "troublesome," and I think Mr. Scott (Jan., 1878) has given "S." the correct reason of his failure in keeping them. I believe that all these difficulties are caused by having the inmates unnaturally select. With a plentiful and varied supply of vegetation, a host of Entomostraca and Infusoria will be introduced, which will form an inexhaustible food supply to the fish. The decaying plants and animal exuvie will form a fine mud at the bottom, in which the pretty little bivalve, *Cyclas cornea*, annelids, &c., will find a congenial home. The water should not be changed or disturbed. In spite of the mud the water will neither be turbid nor odorous, and the student can observe the habits of the inmates under natural conditions. An aquarium, so conducted, may not look so ornamental as an elegant glass vase with a floor of scrupulously clean gravel, above which two or three lazy gold-fish are slowly swimming round a solitary plant; but it will afford the microscopist or biologist excellent opportunities of study.—*Edward Step.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP at least a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

W. WAKEFIELD.—Your mosses are:—1. *Hypnum undulatum*; 2. *Neckera crispata*; 3 and 4. *Hypnum sericeum*.

W. A. C.—Your specimens are:—1. *Physcia parietina*; 2. *Evernia prunastri* (both lichens); and 4. *Hypnum squarrosum* (a moss).

F. T. M.—Your moss is *Hypnum confertum*.

M. SKILTON.—Your specimens are:—1. *Hypnum riparium*; 2. *Bryum capillare*; 3. *Hypnum rutabulum*.

J. C. JOHNSTONE.—Your specimens are:—1. *Dicranella heteronalla*; 2. *Rhacomitrium heterostichum*; 3. *R. ellipticum*; 4. *Orthothecium rufescens*; 5. *Bryum crudum*; 6. *B. bimum*; 7. *Rhacomitrium lanuginosum*.

G. S.—Apply to the London Stereoscopic Company, Regent-street, London; or to James How & Co., 5, Bride-street, London; or C. Baker, 244 and 245, High Holborn, London; or J. H. Steward, 406, Strand, London, and inform them of the kind of lantern slides you require.

C. SWATMAN.—The article you refer to has not yet appeared.

C. HARRIS.—The following are the names of the zoophytes sent:—1. *Flustra*? 2 and 3. *Sertularia polygonia*; 4. *Sertularia operculata*; 5. *Antennularia antennina*.

A. W. P.—We do not think your chrysalides will harm under the circumstances.

A CONSTANT SUBSCRIBER.—A facsimile reprint of Walton's "Compleat Angler" has been issued by Messrs. Eliot Stock. Frank Buckland's "Popular History of British Fishes" is cheap and good. Couch's "British Fishes" is our best and largest book on the subject.

T. Q. C.—The fungus is called *Peziza aurantium*.

J. K.—Your sponge specimen is *Halichondria* (or *Chalina*) *oculata*.

THE BOTANICAL EXCHANGE CLUB.—Those members who may be still waiting for return parcels are requested to bear the delay, which has been owing to the severe illness of the Secretary. No time will be lost in distributing the parcels as soon as possible.

W. B.—The present address of the South London Entomological Society is the South Metropolitan Temperance Hall, Blackfriars-road, S.E.

K. D. (Almondsbury).—Your shells are: 1. *Clausilia lamnata*; 2. *Balia perversa*; 3. *Cochlicopa lubrica*; 4. *Bulimus*; 5. *Pupa marginata*; and 6. *Succinea putris*.

J. SIMS.—The "coloured matter" sent was doubtless iron oxide, produced perhaps by the decomposition of the argillaceous carbonate of iron nodules often so abundant in the coal measures. The piece of limestone shale is of carboniferous age, and is impressed with *Producta*, *Orthis*, and *Rhynchonella*.

R. M. CHRISTY.—We have no doubt that a published list of British marine shells for labelling cabinet specimens, &c., may be had of Van Voorst, publisher. A cheap book on bird and animal stuffing is that published by F. Warne & Co., price one shilling.

H. HAINES.—Your shells are all correctly named, and many of them are most excellent examples of their kind.

G. A. HOLT.—The object on *Briza media* was not a fungus, but looks like one of the pollen masses of an orchid, transferred by some insect.

J. TEMPERE.—The micro-fungus on leaf of *Lavatera sylvestris* is *Puccinia malvacearum*, Corda.

F. C. KELLAND.—Your micro-fungus is *Phragmidium mucronatum*, Fr., see Dr. Cook's "Rust, Smut, Mildew, and Mould."

GEO. CLINCH.—The fragment of fossil wood sent appears to be from the Portland beds, but it is impossible to tell from such a small piece. The fossil from the chalk is not a tooth, but part of an encrinite.

T. W. B.—The drawings sent us for identification are:—No. 1. *Pleurosigma*; 2. *Stephanodiscus*; 3. *Amphora ovalis*; 4. is not a diatom; 5. *Globigeina* is an interloper. It certainly did not live with the diatoms, which are all fresh-water forms.

J. CUNNACK.—Masters' "Vegetable Teratology" was published by the Ray Society.

A. B. C.—*Marchantia* should be pronounced *Markantia*.

EXCHANGES.

SEND mounted or unmounted material (good) for various Diatomaceous Earths, to W. Wood, 25, Gower-street, W.C.

Monotropa hypopitys offered for 3, 13, 14^b, 15, 33, 38, 96, 104, 111, 116, 117, 151, 162, 187, 195, 209, 216, 220, 222, 227, 251^b, 275, 287, 343, 351, 379, 452, 466, and 474; and *Crithmum maritimum* for 411, 413, 414, 415, 421, 422, 436, and 469.—E. W. Andrews, University School, Hastings.

SEVERAL duplicate slides, well mounted, Diatoms *in situ*, fruited Marine Algæ, Holothuria plates, and other interesting marine objects; some choice unmounted material in Diatoms, Foraminifera, Zoophytes, Holothuria, Algæ, &c. &c. Wanted, Magic Lantern, first-class Slides, or Cash. Will send mine on approval.—T. McGann, Burin, Ireland.

FOR exchange: 690 foreign stamps (in book), all different, of 95 countries, and all genuine. Wanted, Lepidoptera or Eggs.—R. McAlldowie, 82, Bonaccord-street, Aberdeen.

WILL exchange washings from the London Clay containing Foraminifera, Entomostraca, &c., or select specimens of larger Fossils, for Bell's "Monograph on the Malacostracous Crustacea," Part I. London Clay.—W. H. Shrubsole, Sheerness-on-Sea.

DR. PARTRIDGE, of Stroud, will exchange SCIENCE-GOSSIP for 1877 for well-mounted micro slides of parasites,—fish especially wanted.

DUPLICATES.—Missel Thrush, common Snipe, Water Hen, Bald-headed Cock Pewit, Pheasant, Blackbird, Song Thrush, and Greenfinch in exchange for other eggs; side-blown eggs only accepted.—John Thorpe, 2, Spring-garden, Middleton, Manchester.

FOR seeds of Blue Gum (*Eucalyptus globulus*) send stamped envelope to C. P. Ogilvie, Sizewell House, Leiston, Suffolk.

EIGHT years' SCIENCE-GOSSIP, newly half-bound in leather, for good slides or micro apparatus.—R. Bridger, 23, Oxton-road, Birkenhead.

DIATOMS, twenty-one fossil and sub-fossil earths (material) from various parts of the world. Good recent Diatoms wanted (material), marine species preferred. Send list to W. M. Paterson, Westfield-terrace, Loftus.

WANTED, a half-inch objective o 40 degrees, with or without adjustment, made for binocular, in exchange for one of about 80 degrees, with adjustment.—W. H. P., 255, Milkwood-road, Herne Hill, S.E.

Orthostira arenaria, Foraminifera, Post Pliocene, and from Turkish coast, Frog-hopper, section of Pith of Arabia, *Niphoobus lingua*, spores of *Platyserium alpicoma*, and section of Cane. Wanted, objects mounted or unmounted in exchange for above.—T. Watson, Bank Parade, Burnley.

FOR *Aregma bulbosum* send stamped directed envelope and object of interest (Fungi preferred) to Chas. Williams, Kingmeade, Woolcott Park, Redland, Bristol.

MALAYAN and Himalayan Ferns offered in exchange for other kinds from Africa or other parts.—J. N., 14, York-road, Brighton.

WANTED, Lepidodendrons and other stems from the carboniferous system in exchange for geological, physiological, and other well-mounted slides.—M. Fowler, 20, Burn-row, Slamannan, N.B.

7TH LONDON Catalogue: Nos. 171, 812, 1071, 1074, 1463, 1492, 1600, and 1605, and others, for Nos. 35, 46, 66c, 23, 2, lists exchanged.—C. A. O., 75, Mildmay-road, Highbury London, N.

WILL forward Packet of Sand containing Foraminifera on receipt of two penny stamps.—Geo. Clinch, West Wickham, Kent.

LONDON Catalogue, 7th edition: 121, 122, 130, 183, 201, 217, 238, 328, 330, 346, 363, 533, 539, 542, and others. Send list to Edwin Hepworth, 17, Spring-lane, Lees.

TEETH of *Saurichthys acuminatus*, and other small teeth (named), from the Rhætic bone-bed at Aust Cliff, to exchange for tertiary fossils, Barton series preferred.—Rev. K. Deakin, Almondsbury, Gloucestershire.

SEND good slides or material for Siliceous Foraminifera, fossil (rare), or Sucker-foot of *Aclitus sulcatus* (beetle).—Wm. J. Fuller, Broad Plain Soap Works, Bristol.

J. W. BULMER, South Parade, Northallerton, Yorks, will send, post free, 50 varieties of rare Foreign Stamps for British Birds' Eggs.

EXCHANGE.—British and Foreign Shells, Fossils, Minerals, and polished specimens of Madrepones, for Dudley and other Trilobites.—A. J. R. Sclater, 4, Bank-street, Teignmouth.

EXCHANGE.—Can occasionally send Octopus, Squid, Cuttlefish, and a great variety of marine animals to parties who will exchange for the same.—A. J. R. Sclater, 4, Bank-street, Teignmouth.

Zonites purus, *Z. fulvus*, and a few *Rotundata* (var. *Alba*), also a few Birds' Eggs, for British Marine Species or Foreign *Helices*.—Thos. Hedworth, Dunston, Gateshead.

GOOD Slides offered for unmounted material; specially wanted, Parasites and Eggs of Parasites, Eggs of Lepidoptera, &c., also British Polyzoa, Bicellaria, Cillata.—J. D. Pepper, 15, Talbot-street, Moss Side, Manchester.

FOR a Slide of Crystals for Polar send two good Prepared but Unmounted Entomological Objects to Wm. Sargent, Jun., Caverswall, Stoke-on-Trent.

FOR sound pieces of Wood 8 by 6 by 4, showing bark on one side, of No. 46, 205, 297, 299, 382, 480, 482, 516, 616, 621, 830, 848, 1125, 1201, and 1203, I will give in exchange rare British plants or micro slides.—J. Tempere, 23, Croucy-street, Colchester.

WILL send specimen of *Ptychogaster albus* (microscopical fungus) for good plant, moss, or microscopical material.—F. Crosbie, The Chestnuts, Barnet.

WANTED, recent Diatoms from Monteyore Bay and Cuxhaven Mud, Diatomaceous Earth from Stoneyford, County Antrim, and well-mounted slides offered in exchange.—William A. Firth, Whitecock, Belfast.

WILL exchange Book on Diatoms by Prof. A. Mead Edwards, cost 3s. 6d., for some back numbers of SCIENCE-GOSSIP or unmounted micro objects.—E. V., 41, Peckham Grove, S.E.

THE beautiful Green Lizard, *L. Viridis* (living), in any number. Open to offers.—J. Snel, Bagot, Jersey.

IN exchange for any other Mounted Objects, Proboscis of Blow Fly, *Pleurosigma angulatum*, *Amphipleura pellucida*.—Address, T. C. Maggs, Yeovil.

WANTED, Gosse's Works on "Marine Natural History," in exchange for Botanical Works.—C. A. Gwines, 8, Craford-street, Dover.

WANTED, Cuticles, Insects, &c., prepared for mounting, for other material. 200 oz. covers, glass, cheap.—Tylar, 165, Well-street, Birmingham.

SEND well-mounted 3 by 1 Slide for a sample of Diatomaceous Tripoli.—T. Brown, 7, Spencer-street, E.C.

BRITISH Coleoptera. Exchange correspondents wanted.—James Walkden, 183, Broad-street, Pendleton, Manchester.

Melicerta ringens, exchange for living Sea Anemones (*actinia*) or madrepones, or good mounted micro object.—H. E. Forrest, Lloyd's Bank, Aston-road, Birmingham.

LIVING or mounted specimens of *Volvox globator* in exchange for good mounted or unmounted objects.—John Levick, Lime-tree Villas, Albert-road, Aston, Birmingham.

BOOKS, &c., RECEIVED.

"Accidents in Mines." By Alan Bagot. London: C. K. Paul & Co.

"Industrial Art." February.

"Land and Water." February.

"Journal of Applied Sciences." February.

"Chambers's Journal." February.

"Science pour Tous." January.

"Botanische Zeitung." January.

&c. &c. &c.

COMMUNICATIONS HAVE BEEN RECEIVED UP TO THE 12TH ULT., FROM:—W. H. G.—T. S.—T. B. W.—F. W. E. S.—H. V.—P. T.—J. D.—J. M. M.—E. W. A.—C. P. O.—Dr. B.—W. D.—S. A. B.—A. S. A. M. Mc.A.—Dr. E. H. V.—R. Mc.A.—J. W. B.—Dr. C. R. B.—E. C. R.—J. R. J.—M. K.—J. G.—C. B. M.—C. D. W.—T. Mc.G.—G. R. V. Jun.—J. B.—W. D.—R. G. C.—R. B.—G. S.—L. T.—T. W. D.

—R. M. C.—T. H. C.—S. H. L.—W. T. V. D.—W. M. P.—H. P. M.—J. R. J.—W. L. B.—H. E. W.—W. W.—G. G.—W. M.—V. C.—W. A. C.—C. H. H.—J. W.—W. G. S.—C. A. O.—W. H. P.—E. C. J.—T. W.—J. A. M.—M. F.—J. B. C.—F. W. T.—W. W.—A. F. G.—R. H. K.—H. G.—Dr. P.—G. O. H.—A. W. S.—E. T. M.—W. H. S.—Major L.—H. G. C.—A. G.—E. C. D.—R. E.—A. S.—Dr. de C.—A. K.—A. W. P.—W. E. G.—E. W. W.—J. C.—V. G.—F. C. M.—G. S.—C. W. C.—D. S.—F. C.—H. W. T.—H. C. D.—E. V.—W. T.—C. A. G.—J. W.—W. A. F.—H. E. F.—A. B. C.—H. A. M.—W. S. Jun.—W. C.—J. Y.—A. J. R. S.—W. B. G.—H. K.—W. J. F.—C. P.—H. F. B.—J. H. H.—G. N.—K. D.—J. D. P.—W. W.—J. W. B.—J. H. J.—A. J. R.—T. Q. C.—J. M.—J. K.—&c. &c.



REPORT OF SCIENCE-GOSSIP BOTANICAL EXCHANGE CLUB.



N approaching this subject it is pleasant to say we have in a measure succeeded beyond our expectations, but we should have been still more successful and have been able to send more of the marked desiderata, had we been supported in our efforts

by more of our working or rather collecting botanists. Evidently it was regarded solely as an *Amateur Club*, so that one of the rules seemed to be totally overlooked in so far that a lot of specimens were sent such as *Bellis*, *Leontodon*; in fact, some few parcels contained only such as could be gathered in a field a few yards from our door. Another year, we are satisfied, all this will be changed for the better.

A few contributors have kindly sent short notes upon any specimens thought to be unusually rare: these we give below. We also name a few good things which we have had great pleasure in distributing:—*Ranunculus floribundus*, Bab., common in the Tweed district. Some of our plants approach *elongatus*, others *triphyllus*, and *confusus*.—A. B. *Ranunculus salsuginosus*. This form is frequent in the river Tweed.—A. B. *Ranunculus fluitans*, Newb., river Lathkill, Derbyshire.—C. B. *Draba muralis*, plentiful in cultivated ground (nurseries), to which it has been introduced about Kelso and Melrose, Roxburgh.—A. B. *Raphanus maritimus*, Lizard Point, Cornwall. We supplied about one half of the parcels with this rare species. *Dentaria bulbifera*, High Wycombe.—T. E. D. *Viola Curtisii*, Lytham.—J. C. M. *V. amœna*, Bishop Auckland.—J. P. S. *V. lactea*, Helston, Cornwall.—J. C. *V. Curtisii*, Land's End.—J. C. *Silene quinquevulnera*. Introduced to the Tweed district.—A. B. *Circea alpina*, β . *intermedia*, Gaitheugh, Berwickshire, where it is abundant: along with it I observed a few patches of *C. lutetiana*,

possibly true "or typical." *Alpina* grows there also, but I did not detect it.—A. B. *Rubus cœsius*, var. *pseudo-ideus*, Springwood Park, Roxburgh. Various forms of *Rubus cœsius* are plentiful in the district, but I have seen this only from the above locality.—A. B. *Rosa pomifera*. On the roadside at the highest part, above Sweethope, Roxburgh: one of the bushes is a fine old plant about 7 feet high, and as much through. They are as far as possible, under the circumstances, from any house or garden, being about halfway between two farm-places. I have never seen it in a garden in the district.—A. B. *Rosa Watsoni*, also common in the Tweed district, and, like *Rosa subcristata*, very variable.—A. B. *Rosa subcristata*. This variety is common in the Borders.—A. B. The fruit of *Watsoni* can scarcely be confounded with any other species, when once recognized. *Alchemilla conjuncta*, Buttermere Fells, Cumberland.—R. W. Upon writing to Mr. W. respecting this locality, which is open to doubt, he informed us the specimen sent was cultivated in his garden, but was originally brought from Buttermere by a friend of his in the North of England. Not the least doubt, however, exists as to its being the true *conjuncta*, and if the locality is also a genuine one, it is one of the most important discoveries our contributors have brought to light this season. We may also add, the leaves are at least one-third larger than the plants we have inspected at Kew and Benthall Hall. *Medicago lappacea*. I have found a few specimens of this species on Tweed-side every year, for the past five seasons. It grows in company with the other Medics (*M. denticulata*, *M. maculata*, and *M. minima*), along with which it has been introduced to the district with-wool.—A. B. *Trifolium Molinierii*, Lizard Point.—J. C. *T. strictum*, Lizard Point.—J. C. The above clovers are old friends. It is pleasing to know they still retain possession of the old station, from which they were recorded many years ago. *Sarothamnus prostratus*, Lizard Point.—J. C. *Helianthemum canum*, Great Orme's Head.—C. B. *Ribes alpinum*, Rokeby, Teesdale.—J. P. S. *Spergularia marginata*, Arnside.

—C. B. *Callitriche autumnalis*, abundant in Yetholm Lock, Roxburgh. Although it has not been recorded, so far as I am aware, from the Till or the Tweed, judging from the large quantity that is annually, after every high wind, carried into the Bowmont, and thence to the Till and the lower reaches of the Tweed, it will very probably be found there also.—A. B. We believe this was recorded by Dr. Johnstone several years since. *Lamium intermedium*, a rare weed in cultivated ground about Kelso.—A. B. *Scrophularia Scorodonia*, Penzance.—J. C. *Pulmonaria officinalis*, some very large patches in Makerstown Woods, Roxburgh. Probably a remnant of monkish cultivation.—A. B. *Veronica peregrina*, a garden weed, at New Louden, Berwickshire.—A. B. This plant is rapidly spreading: it seems but a few years since it was named by Prof. Babington, from specimens then discovered near Perth. *Rumex rupestris*, Helston.—J. C. *Polygonum littorale*, Link, *P. Raii*, both gathered at St. Bees Head.—C. B. *P. arenastrum*, Bor., St. Bees Head.—C. B. *Orobancha carulea*, St. Owen's Bay, Jersey.—G. C. D. *O. rubra*, Gunwalloe.—J. C. *Allium triquetrum*, Helston.—J. C. *Goodyera repens*, Bowmont Forest, Roxburgh.—A. B. Plentiful in many Scotch Fir woods in both Roxburgh and Berwickshire. Most likely it will also be found in similar situations in Northumberland; indeed, I have found it within three miles of the borders of that county. Owing to the increase of plantations, this plant has increased rapidly of late in this district. The *Goodyera* appears to have been one of the original natives of the Borders when this part of the country was covered with forest. When the land was cleared, it, and others of a like nature, would disappear and remain in a dormant state, until circumstances rendered the soil again suitable for their existence. *Cephalanthera grandiflora*, High Wycombe.—Mrs. T. E. D. *Erica tetralici-ciliaris* Penryn, Cornwall.—J. C. *Cuscuta epithimum*, Kingswood-heath, Surrey.—J. L. *Crocus nudiflorus*, Derby.—W. H. P. *Impatiens parviflora*, Ockbrook, Derby.—W. H. P. *Potamogeton nitens*, Web. Abundant in the Tweed and Teviot, in the counties of Roxburgh, Berwick, and Northumberland (Cheviotland). Like others of the genus, it is variable. The description of *P. nitens* in "Student's Flora" says the leaves are recurved,—surely a misprint for incurved.—A. B. *Potamogeton zosteraefolius*, Spondon, Derbyshire.—W. H. P. *P. lancolatus*, River Lligway, Anglesea.—C. B. This is another record for a very old station, originally made public in Davie's "Welsh Botany." *Plantago Timbalii*, Mullion, Cornwall.—J. C. We believe this has not hitherto been noticed in the above county. *Veronica triphylla*, York.—H. R. M. *Mellittis mellissophyllum*, Beeralston, Devon.—W. H. *Carex humilis*, Leigh Woods.—W. G. *C. filiformis*, abundant in Lurgie Loch, Berwick; Prins-de-bog, Rox-

burgh; and Campfield Bog, Northumberland.—A. B. Wherever this species is met with, it is generally abundant; such is our limited experience. *C. digitata*, near Tintern Abbey, Monmouthshire.—C. B.—*C. ornithopoda*, Cresbrook Dale, Derbyshire.—C. B. Three of our contributors send a limited supply of the above novelty. It will doubtless be new to most of the members. *Carex punctata*, Gaudin. Ledges of perpendicular rocks in the Waterwinch, Tenby.—C. B. We hope again shortly to refer to this species; the fruits have been submitted to Dr. Syme. *Cyperus longus*, Rennoch Valley.—J. C. *Juncus pygmaeus*, Lizard Down.—J. C. We are glad to be able to supply the whole of the members with this species, which is, comparatively speaking, a recent addition to the British Flora. *Scirpus parvulus*, mouth of Ovoca, Arklow.—C. B. *Kobresia caricina*, Widdy Bank, Teesdale.—J. P. S. *Leersia oryzoides*, Woking, Surrey.—H. E. W. It is but seldom good specimens of the *Leersia* can be secured; nearly all we have seen have been imperfect: the few we have on this occasion distributed are excellent examples. *Bromus Lloydianus*, near Lizard Point.—J. C. *Ophioglossum ambiguum*, St. Martin's, Scilly Isles.—J. C.

A total of forty-four parcels of plants were sent out. In each case we made as good selection as was within our power.

DOES DESICCATION KILL DIATOMS?

A COMMUNICATION on the above subject, by M. P. Petit, was made to the Société de Botanique, Paris, and as the subject is of considerable interest to the diatomist, we have much pleasure in reproducing it.

"As the heat of summer dries the ditches, pools, and puddles, one sees that when the last trace of humidity vanishes, the diatoms with which they were stocked also disappear. But when the rains of autumn and winter refill the places we have indicated, the diatoms revive and soon reappear in great numbers.

For some years I have gathered with care the dried surfaces of the ditches in which I knew that great quantities of diatoms existed, in the hope of finding traces of spores or zygospores. I, however, never found anything but empty frustules mixed with the soil that had served as a substratum. Never being able to find traces of spores, the idea occurred to me to make experiments on the diatoms when placed under the same conditions as occur in nature. I therefore collected, at divers periods of the year, the diatoms, with their substratum of mud or clay, and submitted them to desiccation in the sun, placing the material in glass vessels covered, to keep them from dust, some for six, and others for eight months.

The desiccation was such that the deposits at the

bottom of the vessels were cracked in every direction. In the month of September last (1877) I examined some fragments of these deposits. I saw that the frustules were there, and also that they were transparent and apparently empty. But on making a more careful examination, I saw in the interior of one of the extremities, in a majority of frustules, some brown granules, which I considered were the remains of the dried endochrome.

The vessels were then filled with distilled water sufficiently aerated by prolonged agitation; after this they were exposed to the direct heat and light of the sun.

During the first two or three days there appeared but little change in the frustules, but on the fourth day the large brown granules had augmented in size, and had taken the yellow tint characteristic of the diatomaceous endochrome. In following from day to day the augmentation of the plasma, I remarked that on or about the fifth day this nearly filled the middle of the frustule, and on the eighth day it had assumed the normal form peculiar to the genus to which the species belonged. The naviculas had resumed their curious movements, and some days later it became evident that a number of the frustules had commenced to multiply by self-division.

In the presence of these observations, we are able to conclude that the diatoms, like many other of the lower organisms, preserve the vegetative force in spite of desiccation. At the same time I observed a circumstance which deserves mention. In one of the vessels a large number of diatoms were attached to the sides of the glass: in these the endochrome never returned to its normal condition. It is probable that the plasma had been killed by too rapid a desiccation, while the diatoms on the surface-dried less rapidly as the substratum slowly lost its humidity: the plasma was, therefore, able to contract slowly; thus preserving the power of returning to life under the influence of favourable conditions. It seems, therefore, necessary, in order that the diatoms should preserve their vegetative force, that the desiccation should proceed slowly; and that is exactly what takes place in ditches and pools. After these facts, it is easy to comprehend why, during the wet season, we are able to find, almost directly, the diatoms for which we have searched in vain during the drought."

(*Note by Translator.*—These experiments will, I think, not only account for the rapid reappearance of the diatomacæ in dried-up pools when these were again refilled, but will also explain their presence in such habitats as the moss on the trunks of trees, roofs of cottages, or the damp places near leaky water-butts or tanks. The *débris* from the dried-up ditches is raised by the wind as fine dust, and carried, perhaps, miles away, and after a time deposited in the localities just alluded to; the presence of moisture not only soon restoring their vegetative power, but enabling them to reproduce by self-division.

Those who have examined gatherings from the previously-named sources have, no doubt, been struck with the absence of the larger forms: these have, probably, been eliminated by their rapid subsidence, owing to their much greater weight.)

Norwich.

F. KITTON.

PRIMITIVE MAN :

HIS TIMES AND HIS COMPANIONS.

BY THE REV. J. MAGENS MELLO, M.A., F.G.S.

IN the history of almost all nations there is a point at which that history loses itself in tradition and myth, a point at which we should be left in impenetrable darkness were it not for the new light that has been shed, at any rate, upon the past history of man in Europe by the discoveries of the still young science of Geology. When we attempt to trace back the history of the human race in England, which we may take by way of example, the earliest historical records carry us back to the period of the Roman Conquest; the writings of the Roman Tacitus, and of some other authors of that epoch, show us more or less distinctly what kind of a country this was, and of what sort the inhabitants were which they found in possession; and there history leaves us. We must look elsewhere for any further information. That information lay buried for long centuries beneath the earth: in mounds, in caves, in gravel-pits the foot-prints of primitive man were left for the explorers of the 19th century to track and to interpret.

During the last fifty years evidence has been fast accumulating, showing us that long ages must have elapsed, ages marked by many changes, since man made his first appearance here; evidence slowly received indeed at first, but which has yet surely made its way, forcing upon us the belief that long before the Romans visited our shores, generations after generations of men had come and gone, men to whose eyes was presented a very different England to that with which we are acquainted, men who had as their companions animals very different to those with which we are now familiar. What that England was probably like, what those animals were, and what little we know about those men is the subject of this present sketch.

Many ages before the Romans came there was a time when England, instead of being an island, together with Scotland and Ireland, formed part of the continent of Europe; there was then no Bristol Channel, no Irish Sea, no Straits of Dover, no German Ocean such as we now have them; we must picture to ourselves a northern and western extension of the Continent with a great river, an enlargement probably of the present Rhine, flowing northwards through a wide valley or plain, where is now the sea. Into this river flowed, as tributaries, the Thames and

Humber and other streams; dense forests, wild moorlands and heaths, great swamps and morasses, diversified doubtless in places by green pastures, stretched far away inland from this great valley, as well as from others on the south and west of England. In those early ages, no mild winters were known, though probably the summers were far hotter than any which we now experience. We may even imagine, if we will, snow-covered mountains, with their glaciers creeping down into the valleys, in which the snow would lie thick as winter drew on, whilst the rivers would be sealed up by ice. We may picture to ourselves the animal life of that period. It is winter; from the northern hills and forests come travelling southward, driven by the excess of cold, animals now called Arctic; and in the valleys and amid

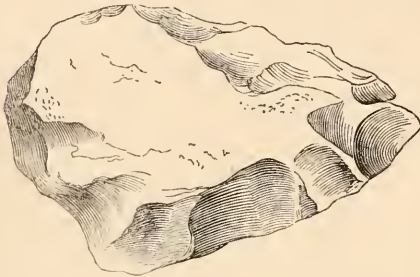


Fig. 51. Flint Implement from Brandon; $\frac{1}{3}$ nat. size.

the woods of middle and southern England might have been seen the herds of rein-deer, the gigantic shaggy-maned mammoths with their huge recurved tusks, smooth-skinned but woolly rhinoceroses, great bears, wolves, and foxes, crafty gluttons, troops of wild boars and other animals. Spring and summer draw on, and as these animals begin to move once again to more northern pasture-grounds, we find with the increasing warmth an influx of other visitors, strange, indeed, to England now,—lions and tigers, and leopards, hyænas, hippopotami, elephants, and other species of rhinoceroses; and thus, in the strange climate of those days, might have been witnessed a continual swinging to and fro, and an intermingling for a time, of Arctic and southern animals, who made this country their home, and many of which were even born here, and here lived and died. Do any ask, how do you know all this? is not all this a mere idle dream? Let us, then, record some of the evidence. These animals have left us their remains to this day; in many a brick-field and gravel-pit, in the soil of numerous caverns, their bones, nay, occasionally even their complete skeletons, have been found, and no chance accumulation this, no stray bones are these, washed in by some great flood or floods from distant regions. The evidence shows that many of these bones were deposited in the very spots near to which these animals died. Sealed up in the floor of many a cave are these relics of the past, not water-worn and

rubbed, but fresh and sharp as to all their angles, sometimes also bone lying close beside its bone, as though quietly dropped and covered up where found, as must, indeed, have been the case, almost immediately after death. Our cave floors give us proof also that many of these animals, the rein-deer, hyænas, mammoths, and others, must have been born in this country. In the same bed, lying side by side, we have found the young and the old, the rein-deer and its fawn, the hyæna and its cub, the young as well as the old elephant or rhinoceros, and a very brief examination of the contents of some of our caverns will demonstrate these facts; we may not only see the jaws, for instance, of the old hyæna with the teeth worn by hard work almost to the gums, but also those of the young animal, in which the permanent

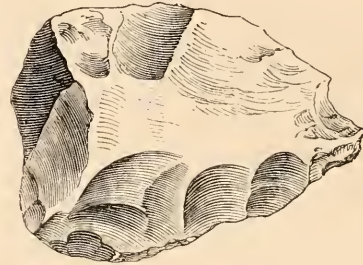


Fig. 52. Flint Implement from Langey, Fr.; $\frac{1}{3}$ nat. size.

teeth are only just sprouting and pushing their way beneath the deciduous ones. Most of the teeth of the mammoths found in caves are those of young animals, and when we come to look closely at all the bones and teeth, we are at once struck with the fresh-looking conditions of the majority, and are convinced that they can have had no long journey to perform between the death and burial of their owners. Another thing which we may observe in the case of bones found in caves is that many of them are seen to be scored and gnawed into their present shape by the teeth of some animal, and analogy has led to the conclusion that the great devourer of the bulk of the animals whose remains are found in caves was the hyæna. This savage beast in those early days, as now, was in the habit of dragging its victims wholesale or piecemeal into its den, where it devoured not the flesh only, but also the bones, rejecting only the very hardest portions; and the teeth, then, left lying about on the floor, would soon be covered up by the mud brought in, partly by the frequenters of the caves, partly by floods, and also by the slow deposits from the moisture which found its way through cracks and fissures. It seems a strange thing that such animals as those spoken of should ever have been found side by side in our country,—the northern rein-deer and the southern hyæna, for instance. Some geologists have not been able to realize that they could thus have lived during the same season, and

have suggested that during those early times there may have been warm and cold periods, each lasting perhaps ten or twelve thousand years, and that "the southern animals lived in our island during the warm periods of the glacial epoch, while the northern animals lived during the cold periods." That there were such interglacial periods of warmth appears to be not improbable, but, allowing this, I do not see how we can, with the testimony of cave deposits before us, fail to be convinced that northern and southern forms did not make their appearance separately, each living here for awhile and then disappearing, but that they lived during long periods actually side by side. The condition of the various bones found is such that they undoubtedly convey the impression of perfect contemporaneity; any way, they are found lying side by side, without a vestige of rolling or wear and tear,

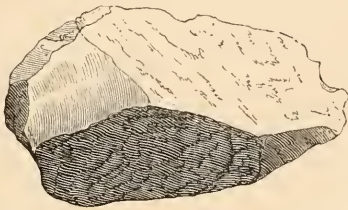


Fig. 53. Quartzite Implement, Creswell; $\frac{1}{4}$ nat. size.

in deposits from a few inches to only a foot or two in thickness; a rein-deer bone, for instance, almost, if not quite, in contact with the jaw of a hyæna, and bearing upon it what we can hardly help believing to be the marks of the hyæna's teeth upon its surface. The remains of Arctic and southern forms are so intimately blended together, and present such similarity of aspect in such caves, for instance, as those of Creswell, and the gnawed bones of rein-deer, rhinoceroses, and other animals are so exactly like the bones gnawed by hyænas of to-day, that the evidence appears overwhelming that they all must have lived side by side; and the easiest way of accounting for such a condition of things is to suppose, as has been suggested, a seasonal immigration and intermingling of the animals in a climate subject to an extreme range of summer and winter temperature, unless we accept as an alternative that the intermingling may have taken place at the commencement or close of an interglacial period, but that there was such an intermingling of forms appears to be beyond question.

Now, when these animals lived in England, man was their companion; there is now not the slightest doubt of that. The evidence, fifty years ago so scanty, so incredulously received, has become overwhelming. To take the evidence of caves alone: in numerous caves in this country, in those of France, Belgium, and Switzerland, traces of man's presence have been found in vast quantity intimately mixed up

in the same beds in which the bones of the animals are found, and showing most clearly that they must have been deposited at the same time. And is it asked, what are those traces? Have you any human bones? The answer is, not many. A few have been found in some caverns, and these have been found to be in exactly the same condition as those of the extinct animals; but I do not think that we have any right to expect to find *many* bones, and one reason is that although man was then present, his numbers were few indeed, compared with the vast multitude of wild animals. Why, even as recently as the time of Queen Elizabeth I believe that the population of all England did not exceed that of London to-day. Man would then be in the proportion of one to many thousands of wild animals, with whom he would have to wage a hard and often

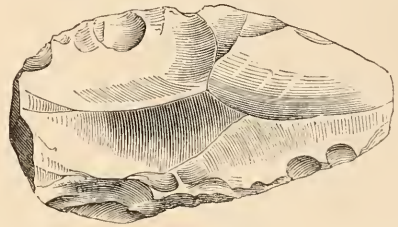


Fig. 54. Flint Implement, Le Moustier, Fr.; $\frac{1}{4}$ nat. size.

precarious struggle for existence. And again, if the men of those primitive times neglected their dead, as do some tribes of men now, the hyænas, wolves, and other animals would not leave many bones to tell the story of man's existence. What we *do* find to prove that man then lived are his weapons and his tools,—rude, indeed, at first, and ill formed, but yet showing a certain amount of design and intention in their shape never to be found in mere naturally-broken stones. Man's first tools and weapons were the pebbles picked up around him, rudely fashioned for such simple work as he required them to perform by a few pieces chipped off here and there, to enable them to be more readily held in the hand, or fastened into holders of bone or wood; such rude tools would serve as hammers to break bones for the sake of their marrow, to scrape the skins of animals killed in the chase with the primitive stone-headed lance or arrow. Implements of this primitive character have been found in abundance in the lower beds of some of the caves of this and other countries, as well as in the ancient river-beds. In England, the caves of Creswell and that of Kent's Hole have furnished many highly characteristic specimens of these earliest efforts of human skill, whilst the gravels of the Thames Valley, of the Ouse and other rivers in this country, and those of Amiens and Abbeville, amongst others in France, have also furnished numerous examples, some made of quartzite and other pebbles, others of flint. In the case of the rude hammer-stones, little has been

done to the original pebble beyond giving it a sufficiently convenient form to enable the user to grasp it, but the bruised and battered face of the implement clearly shows to what use it was put. In the scrapers we see that a sharp edge has been placed by skilful blows on one side of the stone, whilst the other has been probably fastened into some kind of holder. Primitive man would very soon have discovered that few of the stones commonly met with more readily adapted themselves to his wants than the flints so common wherever there was chalk, or, indeed, often found scattered here and there in gravel-beds and other spots at some distance from their original source. The sharp edge of a broken flint, the comparative ease with which it could be variously shaped, soon led man to prefer it to other materials.

The razor-like edge of a flint-flake would be found to make an excellent knife, and such long thin flakes are amongst the implements most commonly met with. They are usually flat on one side, with a well-defined bulb of percussion at one end,—a proof of their having been struck by a deliberate blow from the original block; a mere splinter broken accidentally by the crushing of a mass of flint never has this well-marked protuberance. The upper surface of these flakes has also two or more faces, giving to the specimen in section a more or less triangular aspect. Broader flakes, with a sharpened edge at one end, would adapt themselves as scrapers. We also often find flints with very carefully-worked points, which may well have been used for boring holes in fragments of bone, to form needles, and they might be used, too, for piercing the skins, that the bone needle might more readily pass through. Some of the most primitive implements were large, somewhat oval-shaped, ones, made of flint or some other hard stone; these, which are frequently found in the old river gravels, and some of which are made of quartzite pebbles, have been discovered in the earliest beds of the Creswell caves in England would, if bound firmly into a handle, serve as formidable axes or tomahawks, and were probably used as such.

(To be continued.)

THE REAPPEARANCE OF AN OLD FRIEND.*

BRITISH natural history has produced few works which have become national classics. But White's "Natural History of Selborne" undoubtedly takes rank as such, and finds its place on our library shelves side by side with Goldsmith and Addison. The unaffected and graceful simplicity of the style, the cheerful and yet reverential tone of thought, the quiet love for all that lives, the keen power of observation, and the readiness to draw correct in-

ferences from complex facts, have rendered this work the most popular of its kind that was ever written. There is a freshness and a charm about every page, which seems imbued with the breath of the green fields, and the spirit of the silent woods. One returns to its occasional perusal with delight. It appeals as successfully to youth as to age, and commands its large circle of readers by reason of its broad sympathies. Naturalists and non-naturalists alike confess to its charm. Perhaps no other English work on natural history could have borne half the editing which White's "Selborne" has had to experience. We have editions of all kinds, voluminous and compendious, *éditions de luxe*, and "cheap editions for the people"; and still the work has lived throughout.

In our opinion the present edition of White's celebrated book is the best which could possibly be produced. There are many reasons why this should be the case. First of all the editor, Professor Bell, is himself one of our best naturalists and natural-history writers. No man more fully recognizes the scope of his work—no living naturalist has more pleasant memories of by-gone workers. Moreover, Professor Bell has lived in White's house at Selborne for the past thirty years, and so must have become imbued in no small degree with the spirit and charm of the place. This edition of White's work has, therefore, been edited in the house where it was originally written. The style in which this edition has been published demands a few words of remark. The binding of both volumes is after the modest style which White would have undoubtedly preferred. The engravings and woodcuts (not numerous) are of the best kind of artistic work; the paper is excellent; the type large and cheerful; and there is an absence of those abounding foot-notes in small print on every page, which, in some editions of White's "Selborne," have made its perusal almost a torture.

After saying thus much for the manner in which this edition has been brought out, we have next to draw attention to several matters in which it differs from all previous editions. A few years ago a series of twenty letters, constituting a correspondence between Gilbert White to Robert Marsham, of Stratton, Norfolk, were discovered, and published, we believe, in the "Transactions of the Norfolk and Norwich Naturalists' Society," accompanied by a notice of Mr. Marsham's life, by Mr. Thomas Southwell, hon. sec. These letters are included in the second volume of the present edition. In addition to them are other letters and correspondence of Gilbert White's, which now appear in print for the first time. Such is the correspondence between himself and his brother John, who was English chaplain at Gibraltar, and afterwards vicar of Blackburn, in Lancashire. In these letters we gain a loveable knowledge of Gilbert White otherwise than as a naturalist. His brother seems to have been as simple-minded and guileless as himself, and this correspondence has a quaint, affec-

* "The Natural History and Antiquities of Selborne." By the late Rev. Gilbert White. Edited by Thomas Bell, F.R.S., F.L.S., and Professor of Zoology, King's College, London. 2 vols. London: John Van Voorst.

tionate, brotherly, but unfortunately old-world charm about it that almost makes one sad. The Rev. John White was a correspondent of Linnæus, six of whose letters also appear in these pages. Another correspondence consists of a series of letters, also now first published, between White and his brother-in-law, Mr. Thomas Barker, of Lyndon Hall, Rutland, and the latter gentleman's son. Natural history and archæology are the chief subjects herein pleasantly discussed. The correspondence between the well-known naturalist Pennant and Gilbert White form the bulk of the first portion of the work. In addition to the above new additions to White's "Selborne," rendering it richer and fuller than any previous edition, Professor Bell has had the sympathetic aid of several modern naturalists, among whom the suggestions of Professor Alfred Newton on that part of the work relating to Birds, have unquestionably raised its authoritative value. All lovers of natural history and English classics who can afford it, will have this best edition of White on their library shelves; and all our provincial scientific societies and clubs ought to include it in their circulating list.

THE HARVESTMAN "SPIDER."

THE animal which from the enormous length of its legs has attracted the notice of most persons from childhood upwards, seems from its very slight resemblance in external appearance to the form of a spider to have received a name to which it is not at all entitled; some of the peculiarities of spiders are so exceptional to the general characteristics of all other living beings, that no creature in which they are absent ought to be called a spider. I am therefore induced to compare the harvestman with an ordinary spider, in the hope that some one will suggest its appropriate name.

The first difference that strikes the most superficial observer is, that the bodies of spiders are divided into two distinct portions by a very slender waist which connects the abdomen with the chest and head; in the harvestman the head, chest, and abdomen are all under one shell or horny covering, without any waist or division. The most remarkable feature in spiders is the position and character of the reproductive organs. In the female spiders they are on that portion of the abdomen next the waist, and in the male spiders in a much more extraordinary position, being connected with the head of the animal by the palpi; a further exception to the prevailing order of nature, and equally remarkable, is seen in the fact that each male spider has two distinct and complete organs, one in each palpus, and both exactly alike, one not being the complement, but the exact counterpart of the other. In the different species of spiders these organs vary in a greater or less degree, so that by these differences species might be determined; some

of them are extremely complex and beautiful, as in *Lyniphia marginata*, others, though more simple, are still worth studying. May not the absence of this remarkable apparatus in the harvestman be considered a conclusive answer in the negative to the question, Is it a spider?

Those who have not the opportunity of examining these organs microscopically I would refer to Blackwall's celebrated treatise on spiders, where they will be found beautifully illustrated. This authority says, spiders moult or change their skin from five to nine times, according to species; that the male sexual organs are not commenced in their development till the penultimate moult, and are not completed till the final moulting: now in the harvestman the sexual organs are found in the smallest individuals. In the harvestman there is one slight approach to the resemblance of spiders, the position of the reproductive organs being similar to that in the female spider, viz., nearly close to the chest; in the harvestman the position is the same in both sexes, there is, however, no difficulty in distinguishing one sex from the other; in both sexes the organ is situated within a flexible tube by means of which it is drawn within the abdomen, or projected externally, both organs are represented in the following sketches (figs. 55 and 58).

In the male organ the parallel lines represent the membranous tube, the shaded portion the horny instrument which slides within it by introversion, or something like the tube of a telescope; it may be seen in its normal position (after the body has been rendered transparent) seated within the abdomen with the hooked point near the external orifice, this hook is attached to the shaft by a movable joint, and the hairlike termination of the hook is also jointed, so that it is possible to place the hook in a line with the shaft, though it is always found at a right angle as represented; the length of the organ with its elastic tube extended is about as long as the diameter of the body, the horny portion being a little shorter than the membranous. The female organ, from the great length of its elastic tube, which is about twice as long as the body of the animal, is probably used as an ovipositor, the horny portion is not more than one third the length of the elastic tube; the latter, however, when drawn within the body is shortened by contraction to the length of the horny part then contained within it. This part appears to be formed of a series of bands or rings connected together and terminating in lobes, to which are attached strong tufts of hair, or spines, the bands are covered with stout hairs about as long as the width of each band, and the membranous tube is so thickly studded with minute hairs, that when contracted within the body the organ appears black, the surface resembling that of a steel rasp. It might be supposed that a tube that has to slide within itself by introversion would be greatly impeded by the friction arising from its surfaces being prickly instead of smooth. If we ask

what purpose do these hairs serve, or why is it that all other internal organs being so perfectly adapted by their smooth and lubricated surfaces for moving together without friction, these should present a roughened surface, we might learn a lesson of humility by reflecting that as we proceed step by step in our investigations of the mysteries of nature, we are continually finding how inadequate is the capacity of the human mind to comprehend the designs of an omniscient Creator. I now proceed to the consideration of the breathing organs. Spiders breathe by branchia, organs somewhat resembling the gills of fishes, being a series of thin membranous plates placed together like the leaves of a book in two clusters within the abdomen, one on either side the

spiders says, "the foot (or portion corresponding to the tarsus of insects), is divided into two parts, the tarsus and metatarsus, and in some species into three joints." The tarsus of the harvestman has in some cases as many as ninety joints, the lowest number I have met with being twenty-five. The feet of spiders are terminated by two or more claws, generally pectinated; those of the harvestman have only one claw, curved, but quite smooth. The palpi of the harvestman closely resemble those of the female spider, excepting that the claw at their termination is generally, if not always, pectinated in the spider and smooth in the harvestman, though I have found two instances in which the claws of the palpi were pectinated, although those of the feet of the same

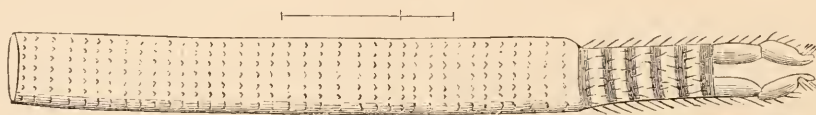


Fig. 55. Ovipositor of Harvestman "Spider." (The lines show actual size of full-grown organs.)



Fig. 56. Falx of Ditto.

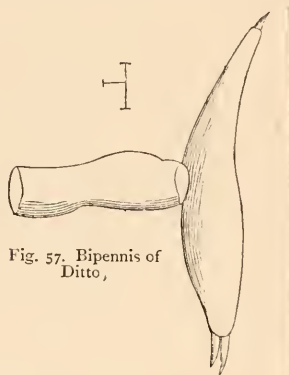


Fig. 57. Bipennis of Ditto.



Fig. 58. Intromittent Organ of Ditto.



Fig. 59. Part of a (Fig. 55) highly magnified.

individuals were not so. The absence of spinnerets distinguishes the harvestman from the generality of spiders, but as some few species of spiders are also without them, this is not a difference of so positive a character as the other points I have noticed. The last organs to which I would draw attention are the *falces*: in spiders these are terminated by a curved claw sometimes deeply serrated on its inner side; in the harvestman the termination is a pair of forceps or nippers like those of a lobster or crab. These *falces* in most of the harvestmen are rather smaller than we find them in spiders, but in some cases they are fully three times larger than we find them in any of the spiders, and assuming quite a different form; in fact, they no longer resemble reaphooks, from which they derive their name of *falces*, but

sexual orifice in the female. The air is admitted to these branchia through stigmata, or horny plates having fine irregular openings, presenting the appearance of a grating, corresponding in some measure to the spiracles of insects. The harvestmen breathe by trachea, the same as insects; there are two spiracles, one on either side of the abdomen; the principal tracheal tube proceeds a short distance from each spiracle, and then divides and subdivides, permeating every part of the body. The eyes present a difference in number only to those of spiders; Blackwall says, "the number of the ocelli in spiders is always two, six, or eight;" in the harvestman the number is four. The same authority in describing the legs of

are much more like pickaxes: therefore, following the same kind of nomenclature, I propose *bipenni* as an appropriate name for them; the fig. 57 shows an outline of their peculiar form and the comparative size that the *bipenni* and the *falces* bear to each other. All the specimens I have found possessing *bipenni* were males; I think, however, these organs do not distinguish the sexes, but a difference of species, as both males and females are found bearing the *falces*; as the upper spur or arm of the *bipenni* is not present in those individuals that are less than half grown, I think it is not fully developed till the last moult, as in some that are about three-quarters grown it is very short

and round at the top, instead of terminating in a sharp point, as when the animal is full grown.

Having now shown (as I think conclusively) that the harvestman is not a spider, will some one tell me what it is?

Norwich.

J. H. CARY.

THE MIGHTY DEEP.

IN a general way persons have a better appreciation of the vastness of the land than of that of the sea; mainly because the former is more frequently forced on their attention. The area of the ocean is nearly thrice that of the land; the one being estimated at about 52 million square miles, and the other at 145 million square miles. On the land, as well as in the ocean, there are vast tracts on which life is absent or scanty; but whereas, on the land the inhabitable portion is to a great extent superficial, in the ocean life occurs more or less abundantly at all depths. The ocean forms one continuous mass of water broken up into irregularly-shaped portions by the land. When portions of the sea are inclosed by the land, the water undergoes so marked a change in character that such inclosed portions (forming lakes and lagoons) can no longer be considered as forming part of the ocean. The great bulk of the sea is concentrated in the South hemisphere, and the pole of the sea (that is, the centre of the hemisphere in which it is most extensive) is in 52° S. 6° E. In this hemisphere the land is to sea as 1 to 8, while in the opposite hemisphere there is nearly as much land as sea.

The mean depth of the sea has been variously estimated, but as yet there are scarcely sufficient data for accurate estimates. Buffon suggested it might be 200 fathoms or 1,200 feet; Lacaille, 163 to 273 fathoms; Laplace, 656 fathoms; Lyell, 2,600 fathoms; and Herschel, 3,520 fathoms. The most probable mean is about 2,600 fathoms. Assuming this as correct, the average volume per square mile would be 418,176 million cubic feet, and the total volume 60,635,520,000,000 million cubic feet. The mean height of the land is 1,000 feet above the sea-level, which would give a volume of 1,449,676,800,000 million cubic feet for the supramarine portion. Hence the ocean's bulk is 41 times greater than that of the land above its upper surface.

One of the causes now in operation which tend to make the ocean encroach upon the land is the introduction of detrital matter into the sea. Every grain displaces its own bulk of water, and so far causes it to encroach upon the land. Denudation is always going on at a probable mean rate of one foot in 3,600 years, at which rate all the land would be removed in about ten million years. The sea, in that case, would gain on the land at the mean rate of about five square miles per year. If all the land

were transferred to the sea, the mean depth of the latter would be reduced to 1,500 or 1,600 fathoms. Other causes, however, may influence the extent of the ocean. One is the subsidence of land below the sea-level and elevation or subsidence of the sea bottom. The subsidence of the whole of the land would involve a depression of about 30,000 feet; and the elevation of the whole of the sea bottom would require an uplift of about 35,000 feet. In all probability elevation and subsidence proceed simultaneously in different parts of the earth, and may or may not counterbalance each other. The bearing of this conjecture is that extensive subsidence or elevation of the sea bottom is calculated to be more influential than the introduction of sediment in causing the sea to advance upon or withdraw back from the land. The introduction of a mass of matter equal in bulk to all the supramarine land would be sufficient to cause the ocean to overflow the land up to about the level of 6,000 feet above the present level; while alterations of level less than those of which the geologist is cognizant, as local phenomena at least, would, if extended over large areas account for the displacement of entire continents and oceanic basins.

It has been assumed that the bulk of the ocean has been approximately unaltered; but surmises might be made upon the variations in the amount of water which, in its æriform and liquid states, is temporarily withdrawn from the sea. A rough calculation indicates that the average amount of vapour constantly in the air corresponds to about 13,412,704 million cubic feet of water, and that the amount of fluid required to keep all lakes, rivers, &c., supplied for six months is about 2,364,072,004 million cubic feet, or about sufficient to form 5,894 square miles of sea of average depth. The entire absence of all flowing fresh waters, or a doubling of their present volume (extreme conditions which are not likely to have happened), would have no appreciable influence geologically in altering the relative areas of land and sea. The accumulation of snow and ice would perhaps be more influential. For, supposing it possible that at one time there were no ice, and that at another some 10 million square miles were covered therewith to a depth of 500 feet, this would give a volume of 139,392,002,000 million cubic feet, which corresponds to 309,071 square miles of sea of average depth. If we assume that the sea has retained its mean depth unaltered, the utmost probable irregularity in the amount of rainfall and in the accumulation of ice upon the land would not cause its area to vary by so much as one million square miles. Hence, from a geological point of view, the possible influence of such irregularities may be disregarded. There is yet another influence to be noticed. It is exceedingly probable—nay, we may say certain—that the sea bed consists of material which is in places permeable, and in others impermeable, to sea water. At what rate the water percolates into the rocks, and what

quantities are retained in them temporarily, we are not prepared to state; but it does not seem likely that the rates of absorption and evaporation have varied much. A certain portion of the water, however, remains in the rocks for prolonged geological periods, and it is believed the amount is constantly increasing. It is not known what the amount may be, but there seems to be no reason to suppose that it has affected the volume of the ocean to any large extent. The conclusion at which we arrive is that at every geological period there has probably been water somewhere on the earth's surface, having a mean depth of over 9,000 feet. It has been suggested that comets' tails may have condensed on the earth, and, as a consequence, given rise to floods; but such speculations may be dismissed as purely imaginative. The attractive influence of the land draws the ocean above the level it would otherwise have, and thus causes the water to encroach upon the land; but such elevation of the water is a local phenomenon only, the mean level of the ocean being in no way affected.

The existence and, to a large extent, the conditions of the present sea are indicated by direct evidence; but the position, depth, and conditions of the seas of former periods can only be ascertained by indirect means; and mainly from the fossil remains found in strata. The occurrence of a species belonging to a group of organisms which, so far as known, is exclusively marine, is a fair proof of the co-existence of marine conditions, provided, of course, such remains have not been introduced by accident or by derivation from older marine beds. In most cases collateral evidence sufficiently indicates whether the stratum is or is not marine. The distribution of marine organisms is dependent upon circumstances, so that a study of these in the case of living species enables us to infer, more or less correctly, some of the conditions of the sea in which they lived; and amongst others that of the contour or depth. The matter is, however, somewhat complicated, for it would seem that depth alone has little influence on the distribution of animals and plants, and that the influencing conditions are temperature, light, food, currents, &c. The evidence then which fossils afford as to depth is probably wholly circumstantial. In the present seas the greater depths are associated with a low temperature, slow currents or movements of water, sediments of extreme fineness, and absence of solar luminous rays; the probabilities are that such has always been the case in the older oceans; but the only constant condition associated with great depth is absence of the sun's light. In closed seas the temperature may be high at great depths, and under certain conditions moderate currents may exist in the deepest oceans. In a general way shallow waters are associated with the stronger currents, the coarser deposits, varied conditions of temperature and accessibility to solar light. Deposits of extreme fineness may occur in shallow and cold seas, which conditions would be

nearly the same as those of the deepest seas; for, irrespective of depth, the principal difference is presence of light in the shallow water. This would allow of the existence of species to which ordinary light is directly or indirectly essential, along with such of the deep-sea forms as could live in association with them. In the shallowest waters along the sea margin we find a certain relation between the depth and particular groups of species of organisms; but examination shows that this relation holds because certain conditions of temperature, exposure to air, food, &c., concur with such depths. These conditions may correspond with a certain depth in one area and with a different depth in another area; so that it becomes necessary to take many circumstances into account before drawing conclusions as to depth from the association of certain species. When the conditions regulating the co-existence of particular species are known, we can readily infer somewhat as to the depth of the water. These considerations have an important bearing upon the geographical distribution of species and the inferences deducible from such distribution in space and in time, and, consequently, upon the continuity of oceans in space and in time, or, rather, on the continuity of certain oceanic conditions.

A. RAMSAY.

(To be continued.)

BOTANICAL WORK FOR APRIL.

THE early part of the present month will be the season to work at several species: thus, the common Pilewort (*Ranunculus Ficaria*, L.) is now in full bloom in some parts of Britain. We have been recently taught to regard it as comprehending two distinct species; for example, it is divided into two varieties, viz., a. *divergens*, F. Sch.; b. *incumbens*, F. Sch. The first variety, a, has lobes of lowest leaves *not overlapping at the base*, lowest sheaths narrow: variety b, *incumbens*, has lobes of lowest leaves *overlapping at the base*, or parallel with petiole and lowest sheaths, very broad, amplexicaul.

Which of these varieties occurs in your district? It will make many a walk pleasant and delightful to know one is helping to clear up a question not yet satisfactorily answered.

In the south of Europe another form is found; in fact, a distinct species, named by most botanists *Ranunculus Ficariaeformis*. Have we not overlooked it in England? It is very similar to our plant, and may quite possibly have been passed over. Let it be cleared up this spring.

Viola sylvatica, Fries.—This is another species which can be worked up in April. Most of our readers are aware that from the days of Linnæus until a very few years ago, this plant passed current under the old name of *V. canina*; nay, not a few still persist in knowing it under the old name, and refuse to listen to the "*new species*." Linnæus's name

(*canina*) was applied by him to the present and another species, *V. canina* of Babington's "Manual." When it was found needful to separate the two, this name was restricted by Fries to the one now recognized as the true *canina*, and he proposed *sylvatica* as the present species. Most European botanists at once adopted his views, but it was some time before we recognized the new species. But we wish to call the attention of our readers to another fact, which may be advantageously worked at in every district, for *V. sylvatica* comprehends two well-marked varieties, viz., a. *Riviniiana*, b. *Reichenbachiana*. We have many book species, with not near the distinctive characters possessed by the above. *V. Riviniiana*, Rich., has the leaves broadly cordate, acute; calycine appendages persistent, broad; petals blue, remarkably broad, lower one with many branched veins at its base; spur thick, cream-coloured, or very light blue. *V. Reichenbachiana*, Bor., leaves cordate, prolonged; calycine appendages small, narrow; petals bright lilac, lower one with parallel, few, nearly simple veins at its base; spur flattened, light lilac. If the above varieties are once recognized, they will never again be mistaken. The common form, that often called *V. canina*, Linn., is seen as a roadside plant on every sunny bank or sandy lane in the northern counties, but *V. Reichenbachiana* is generally found, and then very sparingly, in deep, damp ravines and glens, where the sun seldom penetrates, although sometimes seen on the same bank with the common form. It may be identified at a glance, the peculiar lilac petals exceedingly narrow when compared with any other species; also the narrow, often sharp-pointed spur, just tinted with pale lilac: the leaves are, when young, pale green, not thick, fleshy, and dark green, like *Riviniiana*, and it is altogether the prettiest violet known in the British islands.

Draba verna, L.—Continental authors make six species out of our earliest spring gem, the "Whitlow Grass" (*Draba verna*). We have often wondered how many of these could be found on our old walls or sandy pastures. After fifteen years' experience in the northern counties and Wales chiefly, we can only detect three varieties, for we do not think they can fairly take rank as species. From Boreau, "*Flore du Centre de la France*," we take the following; so that our friends, who may have the opportunity, may work them out:—1. *Erophila* (*Draba*) *brachycarpa*, Jord. Leaves oval, lanceolate, narrowed at both extremities, entire, clothed with simple and bifurcate hairs; flower-stalks slender; sepals oval, hispid; petals oboval, oblong; pedicels flexuose, 2-4 times longer than the silicules; silicule very obtuse at summit; seeds elliptical, few in number. Loc. old walls and rocks; "*the first to flower*." 2. *E. glabrescens*, Jord. Leaves dark-green, lanceolate, narrow, gradually tapering into a long petiole, often smooth; sepals oval, a little hairy; petals oboval, oblong, with slightly

spreading lobes; pedicels hardly three times as long as the silicules; silicules nearly evenly oblong, elliptical; style very short; seeds 20-24 in each hemisarp. Loc. dry open places. 3. *E. medioxima*, Jord. Characters same as in *E. glabrescens*, only the pedicels are longer, 4-5 times the length of the silicule. 4. *E. hirtella*, Jord. Leaves linear lanceolate, pointed, narrowed into a broad petiole, often furnished on each side with one or two very sharp teeth, covered on both sides with long, spreading, often bifurcate hairs; flower-stalks flexuose, hispid at their base; sepals oval oblong, a little unequal at the base, clothed above with long recurved hairs; petals oblong; seeds oval, brown, covered with minute points, 30-35 in each cell. Loc. sandy places. 5. *E. stenocarpa*, Jord. Leaves linear, pointed, narrowed into a footstalk of nearly their own width, covered with numerous bifurcate hairs; flower-stalks flexuose, numerous, in crowded tufts; sepals oblong, hispid; petals oblong; seeds oval, pale brown, a little rough, about 40 in each cell. Loc. dry open places. 6. *E. majuscula*, Jord. Leaves ash-green, oblong oboval, a little pointed, wedge-shaped at the base, with a petiole slightly narrower than their own breadth, entire, or more usually bordered with strong teeth, clothed with short, thickly-set bi- or tri-furcate hairs; flower-stalks often hispid in their lower half; sepals rounded oval, slightly hispid near the summit; petals large, nearly three times size of calyx, oboval, veined, with wide obtuse lobes; seeds oval, pale brown, finely covered with raised tubercles, 40 in each cell. Loc. dry sandy pastures. They are thus divided dichotomously:—
1. Lobes of petals, more or less apart, spreading, 3; lobes of petals nearly contiguous, 2.—2. Silicules rounded, very obtuse at the top, 1; silicules oblong, much narrowed below, 4.—3. Leaves linear or lanceolate, narrow, 4; leaves oblong oboval, 6.—4. Sepals oval silicules oblong, elliptical, 5; sepals oblong; silicules linear oblong, 5.—5. Pedicels hardly three times the length of silicule, 2; pedicels 4-5 times as long as the silicule, 3. We have met with No. 1, *D. brachycarpa*, Jord., frequently in sheltered nooks; also *D. glabrescens*, Jord.: the latter comes into flower a week or two later, and is what we have recognized as our "*common*" plant. Then occasionally we have come across what we should most unmistakably name *E. majuscula*, Jord.: however, as it is an open question, we hope it may soon be settled, as to whether we have two, or three, or even six varieties amongst us.

F.

GLOW-WORMS.—Returning from Barnstaple on Friday evening, the 22nd of February, I was surprised to observe a glow-worm shining as brilliantly as in summer. To be certain I was not deceived, I caught and brought it safely home in a vesta box. Is it not very rare to see them at this time of the year?—*Arthur Smyth, Parracombe, North Devon.*

THE SEALS AND WHALES OF THE
BRITISH SEAS.

By THOMAS SOUTHWELL, F.Z.S.
No. IX.

THE PILOT WHALE (*Globicephalus melas*, Trail), known in Shetland as the Ca'ing or Driving Whale, is a frequent, although a very uncertain, visitor in British waters. It is met with, according to Lilljeborg, in the North Sea and northern part of the Atlantic Ocean, occasionally as far north as Greenland; off the Orkney and Shetland Islands it frequently makes its appearance, and has been found on the British coast as far south as Cornwall. In

following. Bell gives many instances of large numbers of these animals being taken, the last of which, quoted from the "Zoologist" for 1846, is, perhaps, the most extraordinary. It is there stated, "on newspaper authority," that 2,080 were taken in Faroe in the previous year within six weeks, and that 1,540 were killed *within two hours* in Quendall Bay, Shetland, on the 22nd September, 1845. This species (fig. 61) is remarkable for its peculiarly rounded head,—hence its generic name; the flippers are long and pointed, the dorsal fin long and low; the teeth about an inch in length, seldom all present in the adults, and the normal number, according to Bell, about twenty-four on either side each jaw; ten to twelve is, however, the more usual number present.

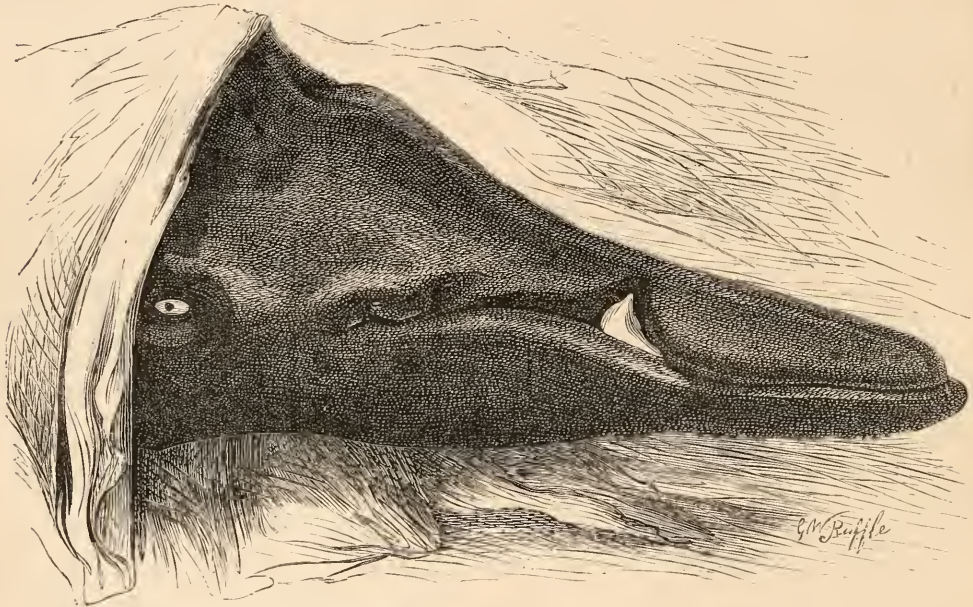


Fig. 60. Head of *Ziphius* or *Mesoplodon* (mentioned in Dr. Busteed's and Mr. Southwell's papers of last month; from Trans. Roy. Irish Acad., vol. xxiv.)

Bell's "British Quadrupeds" it is said that it also appears to enter the Mediterranean. This species is pre-eminently gregarious, and generally occurs in large herds, often numbering several hundreds. So strong is their habit of association that they follow the leading whale like a flock of sheep, a habit of which the Orkney and Shetland Islanders are fully aware, and avail themselves to the full. When a herd appears in one of the bays, boats immediately set off, and, if possible, get to seaward of them, then gradually approaching, with shouts and splashes, they urge the whole herd shoreward, and are generally successful in driving a large portion of the whales into shallow water; but should the leader break through the line of boats, the probability is that no efforts the boat's crews can make will prevent all its companions

The length of the adult is about nineteen or twenty feet, its colour glossy black, with the exception of a white stripe along the belly, which has a heart-shaped termination under the throat. Its favourite food is said to be cuttlefish. The figure is from the "Transactions of the Zoological Society," vol. viii., pl. 30.

The COMMON PORPOISE (*Phocoena communis*, F. Cuv.) is the best known of the Cetacea inhabiting the North Sea, being met with in abundance all round the British Isles, seldom occurring far from land, and often ascending large rivers for a considerable distance: it has been seen in the Thames as high as London Bridge, and in the harbour at Lynn I have often seen it. Nothing can be more interesting than to watch a shoal of these animals at sea, sometimes tumbling and gambling under the bows of the vessel

which is passing rapidly through the water, with as much ease as if she were motionless, or chasing each other playfully round and round the ship as she lies becalmed, their white bellies glistening in the clear sea, and frequently, apparently out of pure mad delight, leaping completely out of the water, return-

they just bring the blow-hole to the surface, breathe without stopping, and continue the curve, till in due course they reach the surface again. This is repeated for the whole length of their spacious tank, or is varied by unexpected eccentricities, all indescribably graceful. Under these favourable circumstances for

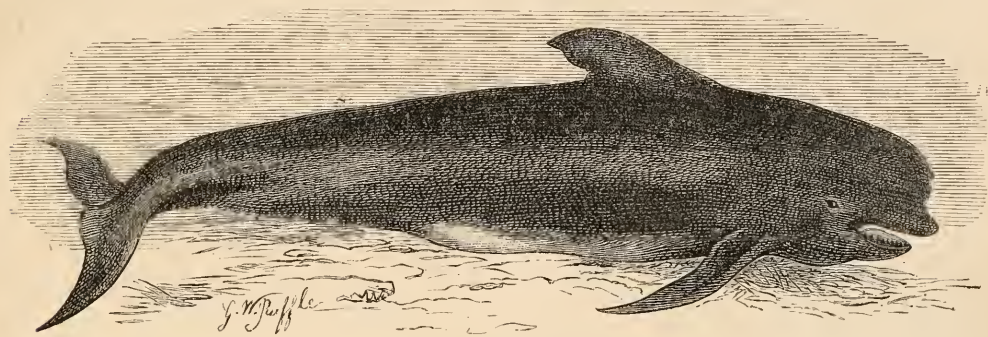


Fig. 61. The Pilot Whale (*Globicephalus melas*).

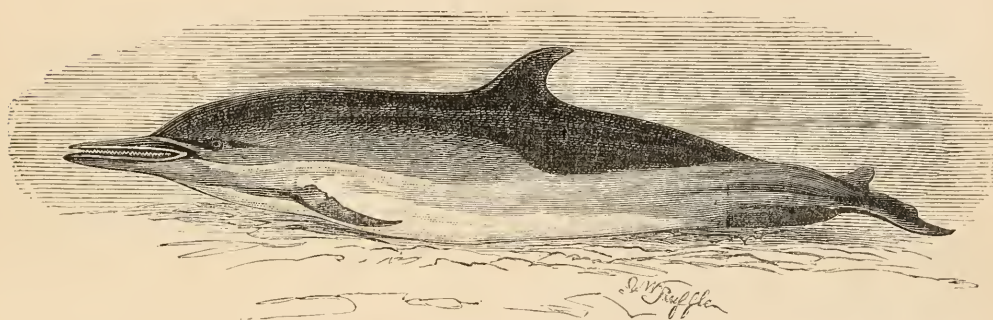


Fig. 62. Common Dolphin (*Delphinus delphis*).

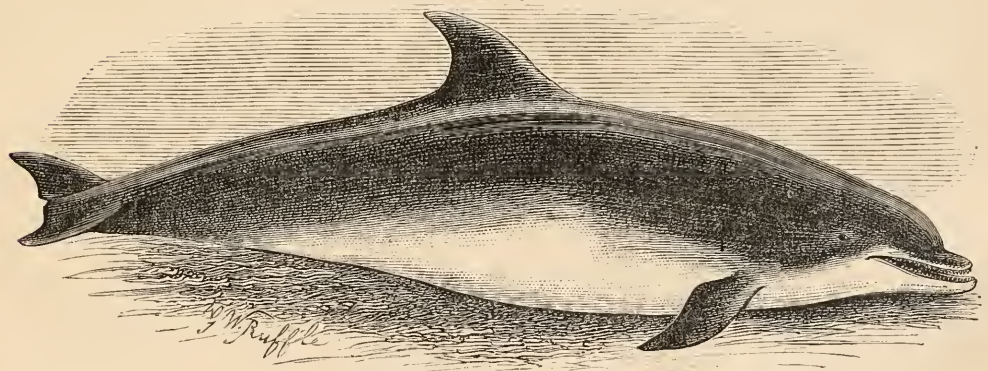


Fig. 63. Bottle-nosed Dolphin (*Delphinus tursio*).

ing to their native element with a most determined header. But it was not till I saw these animals in the Brighton Aquarium that I fully appreciated the beauty, and I may even say the poetry, of their motion; swimming along in a series of gentle curves,

observation it is also clearly seen that the horizontal tail is the propeller which gives the motion; the alternate upward and downward pressure of this organ against the water evidently producing the graceful mode of progression which is so difficult

to describe, but so easily understood when witnessed. All this I understood in theory before, but it was a new and beautiful sight to view the practice from a stand-point, on a level with the animal itself, and as it were in its own element.

The food of the Porpoise consists of fish, and it follows the shoals of herrings, &c., amongst which it commits great depredations; it has a taste for salmon, and is sometimes taken in the salmon-nets. The period of gestation is said to be six months, and it brings forth one young one at a birth; its colour is black on the back, shaded off to silver-grey on the belly, the whole skin beautifully smooth and polished. The teeth number about twenty-five on each side of either jaw, and are spatulate, with a contracted neck, unlike the usually conical teeth of the *Delphinide*. The length is four or five feet. The flesh of the Porpoise seems formerly to have been esteemed as an article of food, and is mentioned several times in the L'Estrange Household Book (1519 to 1578) and other similar records; it is said by one who has eaten

ancients could raise the most gorgeous structures of poetry and religion upon the most slender basis . . . it requires some stretch of the imagination to identify the round-headed creature which is represented in ancient coins and statues, with the straight sharp-beaked animal" which is here figured. It is said to destroy at one fell swoop all the romance which once surrounded this species; but Dr. Gray tells us that "the dying Dolphin's changing hues" are not observed in a cetacean at all, but in a fish of the genus *Coryphæna*, which, although normally black, is stated by Mr. Couch (as quoted by Mr. Yarrell) to have changed to a fine blue whilst he was making a drawing of it. The food of the Dolphin consists of fish, cuttlefish, and crustaceans, and on the Cornish coast it makes its appearance in considerable numbers, according to Mr. Couch, in the month of September during the pilchard season. It is very social in its habits, and even more sportive in the water than its relative, the Porpoise. The upper surface is black, shaded off to white below, the length

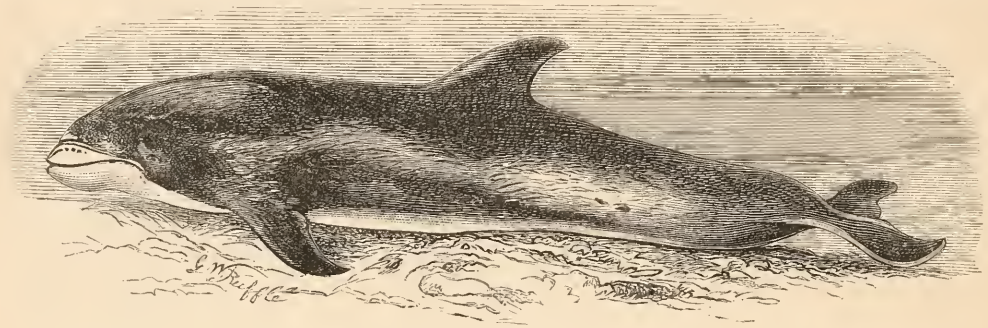


Fig. 64. White-beaked Dolphin (*Delphinus albrostris*).

it to be "excellent meat, dark in colour, and large in fibre, but of excellent flavour, very tender, and full of gravy."

The COMMON DOLPHIN (*Delphinus delphis*, Linn.), fig. 62, is not unfrequently met with in the seas surrounding the British Isles, but it doubtless often passes unrecognized. It may, however, be at once distinguished from the Porpoise by its attenuated beak, the head of the Porpoise being obtuse, and the beak altogether absent. It is a native of the temperate seas, and becomes scarcer as the north is approached. Lilljeborg says it is seldom obtained on the coasts of Scandinavia; in Greenland it is rarely met with. Professor Bell, in his "British Quadrupeds," says: "The mythological and poetical associations which belong to the Dolphin, its reputed attachment to mankind, its benevolent aid in cases of shipwreck, its dedication to the gods, and many other attributes expressive of the high estimation in which it was held in olden times, afford a striking example of how the unrestrained imagination of the

about six to eight feet. The illustration is copied from Reinhardt's figure.

The BOTTLE-NOSED DOLPHIN (*D. tursio*, Fab.), fig. 63, appears to be found occasionally from the Mediterranean to the North Sea; it is by no means, however, a common species.

Of the habits of this species very little is known: its colour is black above, shaded to dirty white below, and its length from 8 to 12 feet. The figure is from a drawing of a nearly adult male taken at Holyhead, in October, 1868, for which I am indebted to the kindness of Prof. Flower.

The WHITE-SIDED DOLPHIN (*D. acutus*, J. E. Gray) is a rare species, which has occurred in a few instances on the British coast: its colour is black above and white below, between which runs a broad band of yellowish brown, about the centre of which, and surrounded by it, is a large oblong patch of pure white. A figure and description taken from one of a herd of twenty landed at Kirkwall, on the 21st August, 1858, will be found in the "Ann. and Mag. of

Nat. Hist." (3rd series) for August, 1864, vol. xiv. p. 133.

The last species on the British list, the WHITE-BEAKED DOLPHIN (*D. albirostris*, J. E. Gray), fig. 64, is also of rare occurrence: it is a native of the North Atlantic, but little is known of its habits. A dolphin of this species was killed at Hartlepool in 1834, but not recognized at the time: the skull is now in the Cambridge Museum. It was, I believe, first described as British by Mr. Brightwell, under the name of *D. tursio*, from a specimen taken off Yarmouth in 1846. His paper, with a figure from a drawing made by Miss Brightwell, will be found in the "Ann. and Mag. of Nat. Hist.," first series, January, 1846, vol. xvii. p. 21. Another specimen was shot by Mr. H. M. Upcher, near Cromer, and will be found recorded by Dr. Gray in the same Magazine, for April, 1866, vol. xvii. p. 312. A fourth was taken at the mouth of the Dee, in December, 1862; and a fifth on the south coast in 1871. A few Continental specimens are also recorded.

In September, 1875, a young female was taken off Grimsby, and in March, 1876, a young male was captured off Lowestoft. The first-named of these latter formed the subject of a communication to the Zoological Society of London, by Dr. Cunningham, of Edinburgh, and the latter of a subsequent notice Mr. J. W. Clark, of Cambridge. Both papers will be found printed in the "Proceedings of the Zoological Society" for 1876, p. 679, *et seq.*, and figures of the two specimens are given on the same plate. Through the kindness of Mr. Clark I am enabled to give a figure of the Lowestoft specimen (fig. 64). Mr. Clark's figure differs considerably from Dr. Cunningham's both in outline and in the disposal of colour, being much more slender, and showing considerably less white; both, however, differ still more from Mr. Brightwell's figure than they do from each other. Mr. Clark's specimen was glossy black on the upper part, and creamy white on the under; the upper lip white, with a black spot at the tip, and a few irregular pale grey cloudings on its surface; the coloration exceedingly beautiful, and such as no drawing could give an adequate idea of. Mr. Brightwell's specimen had the whole upper part and sides rich purple-black, the lips, throat, and belly cream-colour, varied by chalky white. This specimen, an adult, measured 8 ft. 2 in. in length, Mr. Clark's 5 ft. 5½ in., and Dr. Cunningham's 4 ft. 2 in. The teeth vary in number, but are about twenty-six on either side each jaw.

This species concludes the short list of the twenty-two British Cetacea, of which I have endeavoured to give a popular, but I hope at the same time, so far as it is at present known, a reliable account, my principal object, as I stated in my introductory remarks, being to induce those residing in suitable localities to take up the study of this interesting family, and to assist in the identification of those specimens which from time to time are cast upon our shores.

MICROSCOPY.

THE AMERICAN MICROSCOPICAL JOURNAL.—We have just received parts 1 and 2 of vol. iii. of the *American Journal of Microscopy and Popular Science*, and we have much pleasure in calling attention to this unpretending periodical. It is not like our own quarterly *Journal of Microscopical Science*, intended for specialists only, but addresses itself to all who are anxious to know what is being done in those branches of natural history requiring the aid of the microscope. This periodical started into existence in 1876, the annual subscription being 50 cents.: with the commencement of the present year that has been increased to 1 dollar, and the work enlarged from 16 pp. to 24 pp. Amongst its contributors are Professor H. Smith, of Hobart College, N. Y. (the celebrated diatomist), Professor Hitchcock, J. Edwards Smith, Zeus Zundlach, and others. A subscription of 5s., which may be sent in English stamps, entitles the subscriber to a copy every month, post-free. Mr. Charles Stodder, 131, Devonshire Street, Boston, has consented to receive subscriptions.

MACHINE FOR MOUNTING.—I send you a sketch of a little mounting machine, which I have found very useful. A is a zinc vessel to hold hot water;

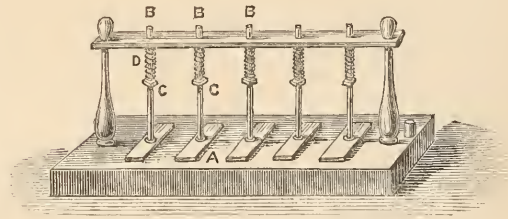


Fig. 65. Machine for Mounting Slides.

B are brass rods, topped with screws; C are nuts; and D are brass springs. By turning up or down the nuts C, any degree of pressure can be obtained upon the thin glass.—*Albert Smith.*

A NEW POSTING-BOX FOR SLIDES.—A new style of posting, or as our American brethren call it, "mailing" box contrived by Dr. R. H. Ward, has proved successful beyond anything tried before. An account of it is therefore published in the hope that it may be made more generally useful. In the boxes hitherto used for posting slides, the slides are occasionally found shattered to pieces, while the box containing them is quite uninjured or only a little strained. In some boxes containing six or twelve slides, half or more of the slides have been found broken in a perfectly sound box. This seemed to indicate not the effect of a crushing blow but the result of the inertia of the slide itself, which was only supported by the wooden racks at the ends and more or less perfectly by the cotton stuffed around it. An

adequate occasion for such an accident might be furnished by throwing the mail-bag from a waggon to the pavement, or transferring it to or from a rapidly-moving train. It was therefore decided to reject the wooden rack altogether, and instead to support the slide by the whole of its edges and much of its sides by cloth, leather, indiarubber, or other soft and evenly-yielding material. This may be attained with the common boxes by removing the racks, lining the top, bottom, and ends with thick, soft cloth, and arranging folds of the cloth, glued or stitched in place, like a rack at each end of the box so that a double thickness of the cloth shall extend between the slides from each end one inch towards the centre. It is better, however, to have the boxes made for this use somewhat larger than the customary size, so that very thick beaver cloth can be used for the packing. For six slides a box may be made of hard wood $\frac{3}{16}$ ths of an inch thick, $3\frac{3}{8}$ inches long, $1\frac{1}{4}$ wide and $1\frac{1}{4}$ deep inside measurement. The folds of cloth should be so arranged that not more than an inch in the centre of the slide is unsupported, except when large cover-glasses are to be used, when more space should be left to avoid pressing on the cover. The outside of the box is covered with strong thin cloth. The comparative safety of this method is indicated by the experience of the American Postal Club. During a trial of several months in many of the circuits, not one slide is known to have been broken while packed in this manner, while to slides in the ordinary boxes with wooden racks, accidents are unfortunately frequent. For sending by express, these boxes should be made of thicker wood, or enclosed in larger cases, to prevent crushing by the weight of heavy packages among which they may be carried.

ACTINOCYCLUS BARKLYI.—I believe this form has not been published, at least in a scientific sense. Some dozen or more years ago a diatomaceous deposit was discovered in or near the Yarra Yarra, Melbourne, Australia, and was distributed under the name of the "Yarra deposit." The form about which "C. V. S." inquires received the MS. name of *Coscinodiscus Barklyi*, in honour, I believe, of one of the governors. It was originally referred to the *Coscinodisci* from the supposed absence of the marginal nodule. It is, however, to be detected by careful examination, although very minute; it is situated on the extreme edge of the disc, and when the inner surface of the valve is uppermost, it is often invisible. *Coscinodiscus fuscus*, Norman, is supposed to be identical with the above species.—*F. Kitton.*

SAP CRYSTALS.—The sap of the Scotch fir contains very beautiful crystals; they may be obtained at this season of the year by cutting a slice through the bark, from the under side of the branch; in a few days the sap will flow containing the crystals.—*S. C. Hincks.*

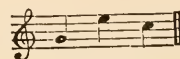
CLEANING DIATOMACEÆ.—I have followed "Davis" in his manner of cleaning diatoms, but cannot

get rid of the flocculent matter and the sand,—in fact, my slides are sand interspersed with diatoms, &c. I have washed, and washed, and washed, till there is very little left out of a rich gathering; can you give me any help?—*H. G. W.*

THE RESOLUTION OF DIATOM TESTS.—At a recent meeting of the Royal Microscopical Society, Mr. Adolf Schulze, of Glasgow, read a paper on "A new and simple Method of Resolving the finest Balsam-mounted Diatom Tests." The author described the success which had attended the examination of this class of objects by means of the reflex illuminator, and the immersion paraboloid moistened with *Castor oil* instead of water. The lines on *Amphipleura pelucida* were in this manner shown in order to illustrate Mr. Schulze's method.

ZOOLOGY.

THE GOLDEN ORIOLE (*Oriolus galbula*).—Can any of your readers supply information respecting the notes of this bird? It is asserted by those who have heard it in Austria, that it has three definite notes, and that those notes follow each other in the following musical order:



If this can be verified, it will elucidate a remarkable statement made by Nieremberg in his *Nature Historia*, 1635, in which he speaks of a bird called the *Tritono Ave*, and to which the late Canon Kingsley refers in his *Life* (vol. ii. p. 332). It is worthy of remark that Bechstein states that the male bird's notes resemble "a flourish of trumpets," and very curiously the above notes are a common bugle-call. It will also be noticed that the last two notes are those of the Cuckoo. If there be any truth in the statement advanced, a very singular musical question is solved, that a bird possesses the power of uttering a "common chord"! This was observed by Shield in his treatise on *Harmony* (1800), and which first attracted the attention of the writer of this notice.—*W. H. C.*

PARASITIC WORMS IN LEG OF GREBE.—When skinning a Little Grebe (*Podiceps minor*, Pen.), on November 25th, 1874, I came upon a cluster of nematoid worms amongst the muscles and tendons of both legs—exactly in the same place in each—near the lower part of the tibia. From their larger size they appeared to have been longer in the left leg than in the right. They were rather hard and stiff—not soft and flabby—of a regular spiral form, of about six turns, tapering to each end, the largest about three-quarters of an inch in length—not following the turns of the spiral: if straight, they would be about an inch long. They seemed unable to straighten

themselves; when found, they were twined together like the strands of a rope, and I observed that one, after being separated from the others, bent *slowly* round until it was twisted on itself. The bird was very much emaciated, and no wonder, as, in addition to the worms in the legs, it had a large fibrous tumour in the back." The above extract is from some "zoological notes" contributed by me to the "Proc." of the Berwickshire Naturalists' Club, vol. viii. p. 288. Lately—February 27th, 1878—I had a similar case, but in a different species of bird,—an immature female of the Water-hen (*Gallinula chloropus*). When skinning the legs near where the muscles end and the tendons begin, there was a quantity of gelatinous matter which, as the bird was apparently healthy and in good condition—not like the Grebe in that respect,—induced me to examine it carefully, when I found in both legs a number of the same worms, or a nearly allied species, to that found in the Grebe. The chief difference was in their not being so *regularly* spiral, various sizes intermixed, and not in such compact clusters. Although some of them were entwined and interlaced together, others, when the lower part of the tibia was pressed from below upwards, came out singly amongst the tendons, with a spiral motion like that of a corkscrew. Perhaps some of the readers of SCIENCE-GOSSIP may, from the above imperfect description, be able to identify the species to which they belong.—*Andrew Brotherton, Kelso.*

THE SOLITAIRE.—Prof. Newton recently drew the attention of the Zoological Society to the statement of Leguat that every Solitaire (*Pezophaps solitaria*) carried a stone in its gizzard, and exhibited one of three stones found by Mr. Caldwell associated with the remains of as many birds of that species in the caves of Rodriguez.

THE NATIONAL ENTOMOLOGICAL EXHIBITION at the Westminster Aquarium well deserves a visit from every entomologist who has the opportunity. The committee who have arranged it are well known entomologists, and it is not too much to say that there never was a series of collections of insects like this got together before. The insect fauna of Great Britain and other countries are shown; insects beneficial and injurious to man; insect productions useful in commerce, &c. Nearly all the collections are sent by persons living in and near the Metropolis. The few exceptions to this rule are Mr. Prest, of the York Natural History Society; Sir Thomas Moncreiffe, who sends a fine collection of Scotch insects; and Lord Walsingham, of Merton Hall, Thetford, whose collection of preserved larvæ, with their food-plants, is one of the most interesting and beautiful objects in the exhibition: the specimens were all prepared by his lordship's own hands, and they represent a great amount of labour and study. Nearly

every class in the exhibition is well represented; the Lepidoptera naturally predominating on account of their greater beauty. The collections of Mr. Wellman, Mr. Stevens, and Mr. Farn are especially good, while among the micro-lepidoptera, Mr. Machin's and Dr. Harper's collections are remarkably good: one case of the latter gentleman's contains upwards of 3,000 specimens. Coleoptera and Hymenoptera are also well represented, the latter by Mr. F. Smith, of the British Museum, whose collection is the result of forty years' labour. The life histories of insects, illustrated by Messrs. Adams, of Enfield, the cases showing the habits of insects, prepared by Messrs. Eedle & Son, and the foreign lepidoptera of Messrs. Cook & Son are highly meritorious.

THE ODONTOPHORE IN MOLLUSCA.—At a recent meeting of the Zoological Society, Mr. P. Geddes read a memoir on the mechanism of the odontophore in certain mollusca. In this paper the view of Cuvier—that the movements of the radula depend upon those of the underlying cartilages—was substantially revived, arguments being adduced against the more recent theory of Professor Huxley, that it runs like a chain-saw, the cartilages merely forming a pulley-block. The use of bacteria as food by *Lymnaeus* was also described by the author in this paper.

"THE FINS OF ELASMOBRANCHS, WITH CONSIDERATIONS ON THE NATURE AND HOMOLOGIES OF VERTEBRATE LIMBS."—This is the title of a paper by Prof. Mivart, read before the Zoological Society, wherein the author detailed his dissections of the fins of Elasmobranchs, which dissections had convinced him that the paired and azygous fins are of similar nature. He represented them all to have resulted from the centripetal growth and evalescence of a primitively distinct series of cartilaginous rays developed in longitudinal folds, of which one was dorsal, one ventral, and two were lateral. He also advocated the view that the limb-girdles result from the further centripetal growth of the evalescing limb-cartilages, which growth seeks a *point d'appui*, the pectoral limb-girdles in fishes shooting upwards and downwards as well as inwards to obtain a firm support, and at the same time to avoid the visceral cavity. He contended that the Archipterygium was not to be sought for in *Ceratodus*, which he by no means regarded as a primitive type of structure, but rather in *Raia* and especially in the ventrals of *Polyodon*. He objected to Gegenbauer's view that the meta-ptyerygium formed the limb-axis of the cheiroptyerygium, advocating instead the proptyerygium, or, if not that, then the mesoptyerygium. He cited the varying conditions described as evidences of the presence of an innate intra-organic polar force as the main agent in morphological modifications.

THE IMPORTATION OF HUMBLE BEES INTO NEW ZEALAND.—There would probably be no great

difficulty in taking out dormant fertile female humble bees to New Zealand, if they were dug up in the early spring, and packed in moss, and put into an ice-chest and kept cool until their arrival at their destination. If, however, the common species, *Bombus terrestris*, were sent out, it might do a great deal of harm, and very little good. It obtains the nectar from the red clover and other flowers with narrow corolla-tubes, or otherwise difficult of access, by boring holes from the outside, as has been shown by Darwin. The red-tailed humble bee, *Bombus lapidarius*, on the contrary, always, so far as my experience serves, goes to the natural opening of the flowers, and is the great agent in fertilizing the narrow-tubed ones. I once watched a small patch of red clover for upwards of an hour. Both of the above species came to it; *Bombus terrestris*, without exception, buried its head amongst the flowers, and made holes at their base, or sucked the nectar from those already made. *Bombus lapidarius* just as invariably went to the opening of the flowers, although the most of them had holes made by the other species. *Bombus lapidarius* has a longer proboscis than *B. terrestris*, and this is probably the reason for the different way in which they go to work. Early in the summer I have seen young individuals of *B. terrestris* sucking the nectar from the flowers of the scarlet runners in a legitimate manner, but they soon learn to make by preference the holes at the base. The successive steps in their education may be watched from their first hesitation, awkward attempts to do this to the instinctive-like facility they attain later on in the season. I know nothing more interesting to a naturalist when he wishes to rest from more serious study than to devote a few hours on a summer's day to watching the humble bees at work amongst the flowers. They have been favourites of mine from early childhood, one of my first experiments being the determination of the stinging powers of the three species, and the time they might be kept between the hollow of the two hands before they got sufficiently angry to sting. My recollection is that *Bombus lapidarius*, although it has the longest proboscis, has also the shortest temper and most virulent venom, and if it be not set free as soon as its first angry note is heard, it will not fail to punish severely. Notwithstanding this trait in its character, I have no hesitation in recommending that it is the one that should be sent out to New Zealand, and that *Bombus terrestris* should not be.—*Thomas Belt, the Cedars, Ealing.*

DEVELOPMENT OF FROGS' SPAWN.—For the last two years I have carefully watched the development of frogs' spawn, and my observations give much quicker results than those noted by Mr. McAlldowie. In 1876 frogs spawned on April 4th, and my note of April 8th says, "Observed tadpoles associated together in twos and threes, gills visible with Codrington lens." Thus in four days my tadpoles were

as far advanced as those of your correspondent in twelve. In 1877 frogs spawned in the afternoon of March 30th; at 9 a.m. on the 5th April one tadpole was free, and at 5 p.m. several were clear of the albumen. If possible I will again collect and watch the spawn this year. If others do the same, and we all send our notes to the editor of SCIENCE-GOSSIP, perhaps he may make some use of them. While examining tadpoles under the microscope in 1876, I fancied that the whole of the exterior cuticle was covered with very minute vibratile cilia. I could find no mention of such a fact in any work, and concluded I must have been mistaken; last year, however, rather confirmed my idea, and as many readers of this journal will doubtless keep and examine tadpoles this year, may I ask them whether my suspicion is correct or not.—*R. B. C., Fanhams Hall, Ware.*

THE HUMAN EYE.—A well-written and attractively got-up book on this subject has just been published by Messrs. Hardwicke & Bogue, from the pen of Dr. R. E. Dudgeon. It deals with the optical construction of the human eye, and has some novel views concerning subaqueous vision, air lenses, &c. The optics of human vision are clearly and scientifically discussed, and yet with a popular and even attractive style of description. The book is well illustrated.

PRACTICAL TAXIDERMY.—We have been frequently applied to to recommend a good book on Taxidermy, and are now glad to be able to do so. Mr. Montague Brown has just completed a work entitled "Practical Taxidermy: a Manual of Instruction to the Amateur, &c." It is the completest little hand-book of the subject we have, giving figures of tools, modes of stuffing and setting up birds and animals of all kinds, preparing skins, &c. It is published at the *Bazaar* office, 32, Wellington-street.

THE FREEDOM OF MODERN SCIENCE.—Mr. John Murray, of Albemarle-street, has issued, in a cheap and well-got-up form, the address on this subject by Dr. Rudolf Virchow, given before the Conference of German Naturalists at Munich last September. The high authority of the speaker and the fact that he has not often expressed his opinions on the evolution theory, although he may be said to be the founder of embryological research, gave his remarks much prominence. The address is a searching criticism into the views of Darwin, Haeckel, Naegeli, and others, and a protest against modern science being led captive by any theory, no matter how fascinating.

NEW SPECIES OF BRITISH INSECTS.—In the last number of the *Entomologists' Monthly Magazine* Mr. P. Cameron describes two new species of *Nematus* under the names of *N. hibernicus* and *N. placidus*.

The former was taken near Dublin, and the latter in England.

THE BARBASTELLE (*Synotus Barbastellus*).—This evening (March 7th), whilst driving near Colchester, I fancied I saw three bats that were new to me. I struck at one with my whip and killed it. On picking up my game, I was pleased to find the above bat was my unknown friend. This district therefore can be added to those in which this rare British mammal occurs.—*Henry Laver, F.L.S.*

BOTANY.

CAREX PUNCTATA, GAUD.—This species was sent to the Botanical Exchange Club, labelled as follows:—"Ledges of perpendicular rocks in the Waterwinch, Tenby.—*C. Bailey.*" This exceedingly rare sedge has hitherto been reported from several places in Ireland, the Channel Islands, and Cornwall: we believe the above locality is new to science. It is very closely allied to *Carex fulva*, Good., but differs from that species by its *smooth humid fruit*, which is obscurely veined, but not ribbed. The fruit is also pale green, but in *C. distans*, L., it is yellowish-brown. The beak is slightly longer than in our herbarium specimens, but the rough nut, tumid punctate fruit, and tall slender stem, at once distinguish this from its near allies.

VEGETABLE TERATOLOGY.—I recently found a singular monstrosity in Harleston Firs, *Anagallis arvensis*, which had the petals transformed into leaves, and the calyx also leaf-like. The plant was fertile. On the Barnack quarries *Trifolium procumbens*, was so called *viviparous*.—*G. C. Druce.*

THE "RAIN TREE."—At a recent meeting of the Linnean Society, Professor Thistleton Dyer described the "Rain Tree" of Mogobamba, South America, under the name of *Pithecolobium saman*. The so-called "rain" is the fluid excreta of cicadas which feed on the juices of the foliage, and its dropping is therefore analogous to the "honey-dew" which sometimes drops from the leaves of lime-trees by the agency of aphides.

POLYGALA CALCAREA.—In the February number of Trimen's *Journal of Botany*, Mr. James Britten notes the occurrence of a specimen of *Polygala calcarea* in a collection of British plants presented to the British Museum herbarium. It is associated on the same sheet as *Polygala vulgaris*, and was collected at Hughenden, Bucks, in June, 1865. It had not previously been recorded as occurring in that county.

MONSTROSITY IN *R. BULBOSUS*.—In a field near Leicester, in June, 1877, I found a specimen of *Ranunculus bulbosus*, having three completely developed whorls of petals, and nearly fifty stamens.

Neither myself nor any of my botanical friends have ever found similar specimens. If the petals were developed from the stamens, the original number of the latter must have been much greater than usual.—*Arthur Wheatley.*

VOLVOX GLOBATOR.—In the neighbourhood of Ashton-under-Lyne *Volvox globator* has been found, by myself and others, in great abundance, from the 24th of last November (on which date it was first detected in our locality) up to March. The pits have been visited two or three times each month since November, and several times we have got volvox from under the ice. I myself gathered it from under half an inch of ice on January 28th, some of which were exhibited at the meeting of the Manchester Field Naturalists' Society on February 3rd.—*Thomas Whitelegg.*

GEOLOGY.

THE INFLUENCE OF THE ADVENT OF A HIGHER FORM OF LIFE IN MODIFYING THE STRUCTURE OF AN OLDER AND LOWER FORM.—This was the title of an important paper, by Professor Owen, C.B., F.R.S., recently read before the Geological Society. The author, after referring to the general question of the modification of the structure of organic forms produced by the action of external influences, indicated that, in connexion with this, changes in the nature of the prey of carnivorous animals ought to be taken into consideration. He inferred that cold-blooded aquatic animals formed a much greater proportion of the food of Mesozoic than of Neozoic Crocodiles, and pointed out as connected therewith the well-marked distinction between the amphiœlian and proœlian type of vertebræ respectively characteristic of the two groups. The proœlian character of the trunk-vertebræ better adapts that part of the body to be sustained and moved in air, and may be connected with the incoming in Tertiary times of mammalian prey inducing the Crocodiles to rush on shore. The Mesozoic Crocodiles were encased in a much stronger and more complete dermal armour than their successors, doubtless for their protection from the great Ichthyosaurs, Pliosaurus, &c., which coexisted with them; but as these passed away at the close of the Secondary epoch, the armour of the proœlian Crocodiles has become more scanty, and the diminution of weight and rigidity thus caused would favour progression in the air, and the rapidity of movement required for capturing mammalian prey on land. The difference in the position of the palato-nares, and in other related gular and palatal structures, between the Mesozoic and Neozoic Crocodiles is apparently connected with the power possessed by the latter of holding submerged a powerful mammal without permitting the

access of water to the posterior nostrils and windpipe of the Crocodile: and hence the author is inclined to ascribe a fish-diet even to those massive-jawed Crocodiles from the Purbeck (such as *Goniopholis crassidens* and *simus*), which in some respects might seem fitted to grapple with large and active mammals. The small size of the upper temporal apertures in Tertiary and existing Crocodiles is regarded by the author as a further proof in the same direction; these apertures are reduced by the progressive increase of the osseous roof of the temporal vacuities, which again is correlated with increase in the bulk and power of the temporal muscles, the main agents in biting and holding. The differences in the length and strength of the jaw, as a rule, testify in the same direction. Further, the fore limbs in Mesozoic Crocodiles are shorter than in Neozoic species, indicating that the former were more strictly aquatic in their habits; the fore-limbs in all Crocodiles being closely applied to the body during rapid swimming, and small limbs being less obstructive than larger ones. On the other hand, they would be less efficient as a means of progression on land, and hence it may be inferred that the advent in Tertiary times of mammals frequenting the water-side, tempting the Crocodiles to make a rush upon the land to seize such passing prey, would lead to such strenuous action of the fore-limbs as would account for the increased size and power of those organs in the Neozoic species. The author concluded with some remarks upon the influence of the above considerations upon our views as to the generic divisions of Crocodiles.

THE GLACIAL PERIOD. — Dr. Ricketts, F.G.S., has reprinted his valuable paper, read before the Liverpool Geological Society, on the "The Conditions existing during the Glacial Period." It also contains an account of the Glacial deposits in the valley between Tranmere and Oxtan, near Birkenhead.

MARINE FOSSILS IN THE GANNISTER BEDS.—Prof. G. A. Lebour has announced the discovery of marine fossils in the lower coal measures, or "gannister" beds of Northumberland, between Stocksfield station and Whittonstall. Hitherto no marine fossils have been met with in these rocks.

THE GEOLOGY OF COLORADO. — The Atlas of Colorado, soon to be issued by the United States Geological Survey of the Territories, under Prof. F. V. Hayden, embodies the results of the geological and geographical work of the survey during the years from 1873 to 1876 inclusive. This Atlas will contain the following maps:—1st, A general drainage map of Colorado, on a scale of twelve miles to the inch. 2nd, An economic map of the same region, having at its basis the above-mentioned drainage map. This map will indicate the areas of arable, pasture, timber, coal, mineral, and desert land in as great detail as

possible on the scale. 3rd, A general geological map on which the areas covered by the principal formations will be shown. The drainage map will form the basis for this also. 4th, A map showing the scheme of the primary triangulation in the State. Scale, twelve miles to the inch. 5th, Six topographical sheets, showing the same area as that covered by the general drainage map, but in much more detail. The scale of these sheets is four miles to an inch. The relief of the country is indicated by contour lines, at vertical intervals of 200 feet. The area covered by each of these sheets is 11,500 square miles. 6th, Six geological sheets, of which the basis is the six topographical sheets just mentioned. On these the detailed geology is expressed by colours. With the appearance of this map, Colorado will be better known, topographically and geologically, than any other State.

WINDS, OCEAN-CURRENTS, AND TIDES.—Mr. W. L. Leighton, F.R.G.S., has published a second edition of his lecture on the above subject, together with the discussion which arose when the discourse was delivered. Mr. Leighton is a formidable antagonist, and is not likely to surrender his own views because some scientific authorities think lightly of them. Even the latter must confess that he makes out a good case.

FOSSIL FUNGUS.—Prof. Lesquereux has recently described a fossil fungus (*Rhizomorpha sigillariae*) discovered under the bark of a *Sigillaria* from the Carmelton Coal of Beaver County, Pennsylvania.

NOTES AND QUERIES.

A SINGULAR PLACE FOR A BIRD'S-NEST.—Whilst waiting on the platform of the railway-station at Coventry, one day last week, I observed an old sparrow's nest built inside a signal-bell. This bell is of a saucer shape, some 10 inches in diameter, and placed with its concave face within about 1½ inch of the side of the "crossover" bridge, and directly over the centre of the railway. The hammer-head of this bell is attached to a long lever, in connection with a wire, leading to a distant operating spot. There is also a heavy counterweight and lever, forming part of the apparatus of the signal; so that when the bell is struck, there is, besides the loud ringing, a great rattle and noise of levers, and a heavy thump caused by the falling counterweight. This bell is used many times every hour of the day, and frequently during the night, three or four blows being struck each time. The officials of the station informed me that inside the bell was a favourite building place of the sparrows, and that the nests had frequently to be removed, but that young ones had been hatched and reared there.—G. A. Biddell, Ipswich.

CARNIVOROUS SLUG.—Whilst perusing the columns of your journal, the accounts of the predatory slug recalled to my memory a circumstance which occurred to me some years ago. While out walking

one day in the country, across my path I observed a slug and a butterfly very close together. On stooping down I noticed that the half of the body of the butterfly had disappeared, and the slug (the common white variety) was busily devouring the remainder. In a short time it all disappeared. Now, the curious part of this is, how could the butterfly have been so unwary as to allow the slug to approach so near? Perhaps some of your numerous correspondents could relate some similar circumstances.—*J. D. O., Carrickfergus.*

ASPLENIUM SEPTENTRIONALE.—In the January number of SCIENCE-GOSSIP there is a paragraph which states that *Asplenium septentrionale* was discovered near Dolgelly, by Mrs. Chamberlain Barlow, of Edgbaston, in 1867. Allow me to inform the writer that it had been previously discovered in the district by the Rev. T. Salway, vicar of Oswestry, and in a "List of certain Plants found in the Neighbourhood of Barmouth," published by him in 1863, this passage occurs: "*Asplenium septentrionale*, a single plant gathered by me on the wall of the turnpike-road between Hendwet and Dolgelly, in 1842," and this note, "I could never find this in subsequent years, though I gathered only a few fronds, and left the root."—*F. C. Rawlings, Barmouth.*

VENOMOUS REPTILES OF IRELAND.—In reply to S. E. Bennett, page 42, for February, I beg to say we have none such; our reptiles are frogs, green lizard, one newt, and Natter Jack, in Co. Kerry. It was not St. Kevin, but a bigger saint—St. Patrick—who sent them adrift from Croagh Patrick, in Co. Mayo. "He gave the snakes and toads a twist, and banished all the vermin," as the song goes.—*F. H.*

SOLANUM DULCAMEARA.—In reply to Mr. W. West, Bradford, as to above, I regret to say I have known two fatal cases in this neighbourhood (Athy) from children eating the berries of this plant. One fact is worth one hundred doctors.—*F. H.*

THE MILDNESS OF THE SEASON.—On the 21st of February, whilst taking my accustomed walk through the beautiful beech-woods of Nettlebed, I was surprised by an adder attempting to cross my path, and having destroyed many of these venomous reptiles, particularly in the county of Devonshire, I found, on killing it, that it was the largest I had ever seen,—its length being not less than twenty-eight inches. The occurrence of this reptile so early, with the primrose and other wild flowers in bloom, on this elevated, picturesque, healthy range of the Chiltern Hills, is a proof of the extreme mildness of the season.—*Thomas Shipway.*

SMALL MITES.—Some newly-married friends of ours, gone to reside in a farmhouse in a pretty, undulating country district in Gloucestershire, have been sadly annoyed for some time past by the presence of numbers of very small mites; they come on their books, clothes, and furniture,—even on the piano specks of dust-like particles are often seen, and an inexperienced eye would think them to be only dust; but, on close inspection, they are seen to move. Benzoline and sanitas have been tried in vain. Can any of your readers throw any light on the matter?—whence they come, or in what way they may be exterminated?—*M. R. D.*

AGE OF SEA-GULLS.—It may not be generally known to what age sea-gulls live. There is a gull living at Freshwater, Isle of Wight, at the present

time, which has reached its thirtieth year, and is apparently as well as ever. It was taken when young from the nest, and was supposed to be a male bird, but when nearly twenty years old, to the surprise of every one an egg appeared, and since that time it has laid many more. All this time it was called by the name of Willie, but the name was then changed to Rittie, which it still bears. The bird is perfectly tame, and comes at once when called. It lives in a garden, and is fed principally on meat and fish; it has also a great liking for cheese. The bird has been in the possession of the same person all its life; I believe it is the common gull (*Larus canus*).—*Frank Morey.*

MIDNIGHT SONGSTERS.—On Feb. 15th and three following evenings, blackbirds, thrushes, and many of the smaller birds have been singing merrily at midnight. The gentleman at whose house I am staying, a doctor, driving late through the park, and several others, have heard the above, but no one seems ever to have known of such an occurrence before. A blackbird was seen while singing, perched on a tree, close to the house-windows. The nightingale has not yet been heard in this part.—*M. B. Gordon, Little Chart, Kent.*

BIRDS SINGING AT MIDNIGHT.—On the night of Saturday, the 15th of February, I was returning home from the house of a friend, between the hours of eleven and twelve o'clock, when I was considerably surprised to hear a thrush singing away merrily. Presently, the songster was joined by others, and in a short time a regular concert began, taken part in by at least a dozen thrushes and blackbirds, whilst the robin, wren, and other small birds were singing and chirruping in the hedgerows, just as you hear them in the early morning in summer. On arriving home, I called the attention of my friends to this singular circumstance, and we stood at the door for some time listening with wonder to this—at such an hour—unusual melody. On the following night, about the same hour, the concert again commenced, and was even more lively than on the preceding night, and continued until morning. On both nights the weather was very calm and mild, and the moon shone with great splendour, making it almost as light as day. I should be glad to learn whether any of the readers of SCIENCE-GOSSIP residing in other parts of the country have noticed this—to me—remarkable incident in the history of our singing birds, which most certainly has never come under my observation before.—*R. Standen, Goosnargh, Lancashire.*

HERRING FISHERY.—A correspondent in your March No. inquires how fishermen tell when herrings are in their vicinity. On this coast most of our cobbles cast their nets by night, and if any herrings are near, they can readily see the phosphorescence caused by this fish, which is generally very brilliant, especially if the night be dark and the herrings plentiful. Nine out of ten of our cobbles do not shoot their nets unless this "flame," as the fishermen call it, be visible. They can also tell the difference between "full" and "spawn" fish, a shoal of the former swimming like a single one, the whole body oscillating gently from side to side as they proceed, whereas, in a shoal of the latter, each fish is constantly on the move, darting restlessly about. This is by far the most useful sign of the approach of herrings, as the following can only be observed during the day, and are even then not very reliable; viz., that if the weather be warm and the sea smooth, a whole shoal will frequently disport on the surface of the water,

their shining bellies gleaming by thousands in the sun, and the innumerable splashes looking at a distance as though a heavy shower, or a sudden gust of wind, were ruffling the water. Seabirds too, usually follow the shoals, and if many are seen "working" together, it is a pretty sure sign that small fish are at hand, though they need not, of necessity, be herrings.—*G. W. L., Bridlington Quay.*

"FAIRY-FLAX."—I see in the January number of SCIENCE-GOSSIP, "E. L. R." asks, What plant is known under the name of Fairy-flax. I believe it is *Linum catharticum*, so-called from its great delicacy.—*A. F. Gissing.*

HARE-BELL.—The following is an extract from Dr. Prior's "Origin and Meaning of the Names of British Plants," on the derivation of Hare-bell:—Hare-bell, a name to which there is no corresponding one in any other language, is in all probability a corruption of some other word, perhaps "Heather-bell." Thomson, in his "Etymons," gives A. S. *hæor*, blue, as its origin; but there is no such word to be found. Prior also traces the derivation of *Hare*, A. S. "hara." Da. "hare." Ger. "hase." Skr. *s'as'a*, from *s'as'*, spring.—*A. F. Gissing, Wakefield.*

HAREBELL.—In No. 159, p. 69, Mr. Holland seems wishful to know if Gerard, in his Herbal, gives any reason why *Scilla nutans* is called Harebell. I beg to say that he does not, at least in Johnston's edition of 1536. He calls the plant *Hyacinthus anglicus*, and in his index names it Haresbell; thus clearly showing that the animal is meant, and no allusion to the stem. *Campanula rotundifolia* he calls the small Bellflower. This latter in Cumberland is almost invariably, except in books, called Bluebells, and often Bluebells of Scotland—some allusion, I suppose, to Blue-bonnets. Hairbell is, no doubt, an appropriate name for Campanula, and so is Harebell; for as its slender peduncles are moved and shaken by every passing breeze, so is the fearful hare (*Lepus timidus*) agitated and stirred by every noise and movement around her. I may also mention to Mr. Holland that the Mountain Flax is in Cumberland often called Mountain Flocks. This shows how strange names are often introduced by substituting for the right term some better-known word similar in sound. The word flax is seldom used here: Line is the common name.—*R. W.*

WHITE HAIRBELL.—With reference to Mr. Tate's remark on White Hairbells, I may mention that my experience of albino flowers has been almost invariably the same as his. I have in my herbarium albino specimens of *Campanula rotundifolia*, *Calluna vulgaris*, *Stachys betonica*, *Geranium robertianum*, and others, all of which have indications of colour, which they did not have when living.—*Albert C. Coxhead.*

WHITE HAREBELL, &c.—On September 5, I gathered white flowers of *Campanula rotundifolia*, between Largetrave and Malham, and they are perfectly white now when dry. I also found white flowers of *Lychnis Flos-cuculi*, at Hawksworth, near Bradford, in July. White flowers of *Scilla nutans* occur regularly about here; also white *Erica cinerea*; but I believe this latter occurrence is not very frequent.—*William West, Bradford.*

WHITE FLOWERS.—A young friend found at Rhyl, in the late summer of last year, a flower of the *Scabiosa arvensis*, perfectly white. We have also met with a root of *Ononis arvensis*, the flowers of which were entirely *album*. The lovely little harebell, or blue-

bell, *Campanula rotundifolia*, I have often met with white, as well as blue; indeed, we had large tufts of both colours, growing in our garden. The *Scilla nutans* is also often to be met with white and even pink. We have from childhood been taught to call the *Scilla nutans* the wild hyacinth, and the *Campanula rotundifolia* the bluebell; this latter name is in Staffordshire mostly applied by the country people to both plants, without any discrimination.—*E. Edwards.*

LONGEVITY IN THE SLOW-WORM.—A very fine specimen was captured by me, near Beacontree Heath, in the year 1850, and was killed by an unfortunate mischance a few days ago. It had consequently been in my possession twenty-eight years. It was several years old when caught, and was in sound health up to the time of the misadventure which caused its death.—*C. Springham.*

TOAD AND GOLD FISH.—In my garden is a tank let into the ground, where it receives a regular supply of fresh water, and affords room for several fish, including some of the carp family, known as "gold fish." On 15th February last I saw one of the latter lying on its side, apparently ill or dead, and a toad just by its head. Reaching a stick, I touched the fish, and to my surprise found it was alive, but grasped *firmly* by the head in the front legs of the toad, which I endeavoured to dislodge. But although the fish struggled *violently*, the toad held fast, and at length carried the fish down among decayed leaves and vegetation in the bottom of the tank. To free the fish, I had to get my gardener to empty and clean out the tank.—*Horace Pearse, F.L.S., The Limes, Stourbridge.*

DREDGING.—"R. G. C." will find that if he dredges near shore from, say a small boat, the hempen tangles, invented by Captain Calver, are a good and simple substitute for the costly and often unsatisfactory dredge, such specimens as *crustacea* and *echinoderms* becoming easily caught, and frequently fishes and *mollusca*; but care is required to extract them from the hemp, into which they are often too much entangled, and thereby spoiled. Gosse's "Marine Zoology" is a useful accompaniment to a dredging expedition, where the above-named orders are being fished for.—*E. Lovett, Croydon.*

SNAKES AND BIRDS.—May I venture to say, in answer to the question in your SCIENCE-GOSSIP, whether the English snake eats birds or not, that I have known two instances in which a snake has been killed with a bird in its mouth. The one case was in Cornwall, when, with some gentlemen friends, I going towards Penzance, when a large snake met us with a bird in its mouth, evidently taking it home for its dinner. One of the gentlemen gave the snake a fatal blow with his stick; so we did not see the actual eating of the bird (but I think we should have hanged a man on less presumptive evidence that it was eaten). The second case was in our own garden, where the gardener despatched a snake on the manure-heap with a bird in its mouth.—*B. H. K.*

INTELLIGENCE OF THE FOX.—One of the Cumberland newspapers last October contained an account of a fox being chased for two hours by the Blencathra foxhounds on Skiddaw and the neighbourhood. The fox was raised from his lair at Lonsdale Crag, and made towards Littleton, "thence over Lonsdale Fell to the Skiddaw Little Man," the hounds being in full cry after him. Thence he ran at a terrific pace to the top of Skiddaw on to Rannel

Crag, through Southwaite Dale, over Ling Howe's Nook, to the Sandbeds at Bassenthwaite. About two hours had now elapsed, and the pace was beginning to tell on the poor fox when his intelligence began to be displayed in a remarkable manner. After crossing and recrossing a road he made towards a stackyard, but, failing to find there the shelter he sought, he took another direction for some distance; but again returned by almost the same route, until he reached a road on which a flock of sheep was being driven. Knowing that he had nothing to fear from these animals, and placing confidence in the driver, he deliberately took his place in the middle of the flock; and, measuring his pace with the sheep, in this manner he travelled with them for some distance. The means he had adopted to save his life might well have excited a feeling of pity and admiration at this remarkable act of intelligence, but the gratification of witnessing the poor animal mangled to death by a pack of ravenous dogs possessed greater attraction, and he was ruthlessly driven from the midst of the sheep, and compelled to devise other means for the preservation of his life. He made to a cottage hard by, and attempted to enter it, but was driven from the door by one of the female inmates. He then passed to the rear of the cottage, and threw his wearied and exhausted frame down on the sward instead. But his rest was brief; he was again aroused by his relentless pursuers, and, making a final effort for his life, he was shortly caught and worried to death. Has the Society for the Prevention of Cruelty to Animals no power to take cognizance of such inhuman acts as this? Here is an animal endowed with little short of human intelligence for the protection of his life, tortured for upwards of two hours, and then torn in pieces for the gratification of his persecutors. Cases twenty times less revolting than this are almost daily brought up by the Humane Society and punished. Burns, when he had turned up the nest of a mouse with his plough, and saw one of his labourers chasing it, indignantly exclaimed, in that beautiful poem to a mouse,—

“I'm truly sorry man's dominion,
Has broken Nature's social union.”

It is no argument, that because the fox, to sustain his life may make free with pheasants, rabbits, and even barn-door fowl, he should be tortured for hours, and ultimately torn to pieces. It is his nature, and his life is as sweet to him as to us. There are other means for his destruction with comparatively little pain without this prolonged torture.—*Dipton Burn.*

AQUARIA.—I have kept a great number of Aquaria, both salt and fresh-water ones. I have often watched the sticklebacks, both salt and fresh-water, and both sorts are very fond of attacking other fish, particularly the fresh-water species. The latter attacked goldfish, roach, sace, minnows, and other kinds of fish, as well as newts and tritons. They nibble the tails and fins off the fish, particularly the goldfish, and the fish get diseased through it and pine away and die. I have lost a great many goldfish by their depredations. They nibble or bite the toes and tail off the newts: I have seen their tails bitten so frequently by them that there has been very little left of them. I should never advise any one to place them in a nice-stocked aquarium, and they should be kept out of small ornamental ponds where there are goldfish. If you wish to see how destructive they are, place some of those fish or animals in an aquarium that I have mentioned by themselves; you will then see that the sticklebacks will not let them rest a

minute; they will worry the poor fish to death.—*A. F. R. Slater, Tringmouth.*

BLACK BEETLES.—On looking over my old SCIENCE-GOSSIPS, I find cucumber peelings are recommended as a bait for black beetles. It is the custom in these parts to throw the peelings near their haunts, under the impression that it kills them; but this paragraph leads me to believe the cucumber merely allures but does not destroy the beetles. Can any of your readers inform me whether it destroys as well as allures them?—*Arthur Smyth, Parracombe.*

EARLY BIRDS.—Our local papers contain notices of a robin's nest containing five eggs, on which the hen bird was sitting on the last day of the year. This was between Watchet and Williton, Somerset. It is also stated that a thrush's nest with four eggs might be seen in a drowsy way at Ilminster, in the same county, the first week in the year.—*W. Macmillan, Castle Cary, Somerset.*

WHAT IS THE WHIPULTRE?—Can any of your readers say what tree Chaucer meant by the “Whipultre?” The word occurs in an enumeration of trees. All those otherwise mentioned are therefore precluded. *Vide* 2,925 of the “Knight's Tale.”—*G. L.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

A. L. (Nottingham).—It is a variety of common water-mint (*Mentha aquatica*).

W. K. (Leeds).—The light, or whitish seeds, are the product of *Cesalpinia caryaria*, often named “Libi-dibi,” probably now corrupted commercially into *Divi-divi*. We could only detect about two of the darker seeds; they must have trickled from the envelope.

D. S. (Ealing).—The brown spots on the under side of leaf of oak are generally called by village children “Oak-stars” and “Oak-spangles.” They are not fungi, but galls produced by *Diptolepis lenticularis*. On the long (lanceolate) leaves you enclose, evidently a saw, is a perfect fungus, now named *Melampsora salicina*. Early in the season it assumes a straw colour at this stage; it was formerly named *Lecythea sp.*, because it was supposed to be a distinct species. It is very common on poplars and willows the year through. The best work on British Botany is Hooker's “Student's Flora.” You should get Davies on “Microscopic Mounting.”

E. CLARK.—We are sorry you are not pleased with the return parcel of plants. With the exception of another botanical exchanger (a lady), all have expressed their high sense of satisfaction with their parcels, the labour and expense of arranging which have been very great.

A. H. H.—You will find full directions “how to preserve spiders,” in an article by Dr. Dyce, under the above heading, in SCIENCE-GOSSIP, for January, 1868. In SCIENCE-GOSSIP volume for 1875 there is an article by our best spider authority, the Rev. Mr. Cambridge, on the same subject, together with several notes and queries relating to collecting and preserving spiders.

E. C. J.—There is no work as yet published on Australian Tertiary Polyzoa that we are aware of. Inquire of Mr. Robert Etheridge, jun., Geological Survey Office, India-buildings, Victoria-street, Edinburgh, who has worked on the subject. Your best plan would be to offer to exchange Polyzoa with C. Harris.

T. SHIPTON.—We should think you would be able to obtain the collapsible nozzled tubes by ordering them through any first-class chemist.

J. S., JUN. (Warrington).—Your sea-weeds are—1. a faded red plant, probably *Rhodymenia palmata*; 2. Fragment of some dried plant, species undistinguishable, covered with tufts of *Calothrix confervicola* and faded masses of *Favia rubens*; 3. Portion of *Halidrys siliquosa*, with tufts of *Sphaclaria cirrhosa*; 4. Probably *Gracilaria confervoides*; 5. Faded and stunted specimens of *Ceramium rubrum*.

X. Y. Z.—There is no examination for the degree of F.G.S. It is purely honorary. You had best apply to the Secretary, Burlington House, for further and fuller information.

J. H. JONES.—Communicate with the Naturalists' Agency, Salem, Mass., U.S.A., respecting exchanges of American lepidoptera. If you look over the Exchange column of some back numbers of SCIENCE-GOSSIP, you will find American lepidoptera offered for English.

E. S. M.—See article in present number as to the Antiquity of Man. You had best write to the Secretary of the Society for list of names, and inclose stamps.

A. S. K.—Get Landsborough's "British Seaweeds," published by Lovell Reeve. It has coloured plates, and the price is 1s. 6d. One of the cheapest and best is Grattan's "British Marine Algae." It contains 205 capital engravings, and is written by one of our best algologists. The price is 5s. 6d. It is published at the Bazaar Office, 32, Wellington-street, Strand.

W. W. WALTERS.—You will find full instructions how to use the cyanide bottle in Dr. Knaggs's article on "Collecting and Preserving Natural History Objects," published by Hardwicke & Bogue, at 3s. 6d.

JOHN ASTLEY.—Your small insects (which came to hand alive) are springtails or *Podura*, and the species sent is *Achorutes purpureus*. They belong to a distinct group of insects called *Thysanurata*. See articles (with illustrations of chief species) in SCIENCE-GOSSIP for December, 1872, and January, 1873.

M. G.—Woodward's "Manual of the Mollusca" is the best book of its kind yet issued. The price is 7s. 6d., published by Lockwood & Co. Any of the kinds of food mentioned would serve as "treats" to the pigeons.

T. W. WALTERS.—You may obtain every article required for natural history purposes from J. Gardner, 246, Oxford-street, London.

F. H. A.—Thanks for note respecting *Gentiana acutis*; we fear it will never occur as a genuine native. The *Sedum* resembled *sexangulare* very closely. It is difficult to tell the difference betwixt this species and *reflexum*, except by seeing the barren shoot,—then it is known at a glance.

G. C. D. (Northampton).—Thanks for *Carex*, which we hope to make use of. The rust on leaf of *Trifolium Molinieri* is a not uncommon fungus. It also affects several species of dock. It is the *Uromyces apiculata*, Lev.

J. C.—You will find in Sach's "Botany," translated and edited by Professor Thistleton Dyer and A. W. Bennett, and published by the Clarendon Press, the best treatise on Vegetable Morphology.

F. W. MORRIS.—It is a common occurrence for the tortoise-shell butterfly to come out on warm sunny days early in the year. Such specimens have been hibernating, and the light and heat have revived them.

H. L. GRAHAM.—Your moss is *Hypnum denticulatum*.

W. THOMSON.—Your specimens of mosses are:—1. *Pottia truncatula*; 2. *Hypnum denticulatum*; 3. *Homalia trichomanoides*; 4. *Anomodon viticulosus*; 5. *Hypnum undulatum*.—R. B.

V. G.—Your micro fungus is *Ceuthospora phacidioides*, Grev.

S. A. B.—The fungus on leaves of box is *Puccinia Buxi*, D. C.

EXCHANGES.

MOUNTED slides of *Craterium pyriforme* in exchange for well-mounted Slides of interest.—S. C. Hincks, Farnham, Surrey.

A QUANTITY of Balsam Mounts, of common but interesting micro objects, for Coleoptera, Birds' Eggs, or anything interesting.—C. W. Lawton, Essex-road, London.

Isoties hystrix, *Helianth. guttatum*, *Orobanchæ carulea*, and *Gymnogramma leptophylla*, &c., for *Lathyrus palustris*, *Galium Anglicum*, *Arnoseris pusilla*, *Carex tomentosa*, &c.—G. C. Druce.—Also G. C. Druce, Northampton, will be pleased to hear from the contributor to Exchange Club who sent specimens collected by Mr. Notcutt.

Asterina gibbosa (small) for foreign Echinus Spines.—J. Keogh, 25, Camperdown-place, Yarmouth.

FIRST two vols. Cassell's Birds, in red leather, 12s. 6d. Also wanted, first 12 parts, Morris's Birds, 2d edition, exchange for Morris's Butterflies, 1st edition, 12 parts.—E. Evans, Brimscombe, Gloucestershire.

WELL-MOUNTED slides of Polycystina and rare Foraminifera in exchange for others, or Lepidoptera.—Phonographer, 78, Lozells-road, Birmingham.

LIVING Ferns and Alpine Plants, interesting microscopic Slides and material, &c., in exchange for Section-cutter, really good Slides, or material. Please see my offer in March number. List free.—T. McGann, Burren, Ireland.

BIRDS' EGGS.—Wanted, oological correspondence, and exchange with some of the numerous American, Colonial, and Foreign readers of SCIENCE-GOSSIP. All letters answered. William H. Armitage, Etruria Villa, Crookes-road, Sheffield.

WANTED, Mounted Microscopic Objects of every description for mounting materials. Send specimen and state wants.—E. Atkins, 200, Essex-road, Islington, London.

FOREIGN SHELLS.—Duplicates, mostly of Japanese, Chinese, Burmese, Java and Philippines, Australian. Desiderata: principally North and South American, West Indian, Mediterranean, Spanish, French, Algerian, and Egyptian; also Duplicates of about fifty sorts of British Land and Fresh-water Shells for the above desiderata. Exchanges invited.—W. Sutton, Upper Clarendon, Newcastle-upon-Tyne.

H. lamellata, *H. aculeata*, *H. pygmaea*, *Z. radiatulus*, and *H. fusca* for any good *Anodons*, *Unio tumidus*, or *Pictorum*, from any place where I have not got them, in England.—J. Whitwham, Cross-lane, Marsh, Huddersfield.

MANY species of British Shells, Sea, Land, and Fresh-water, offered in exchange for foreign Clausilias.—Address: F. M. Hele, Fairlight, Elm-grove-road, Cotham, Bristol.

A PAIR of Telephones in exchange for Microscopic Slides, well mounted.—L. Hawkins, 77, Castle-Down-terrace, Hastings.

SMALL collection of Coleoptera, in good order, or well-mounted objects, for cabinet, specimens of Flint Sponges from the Chalk.—Address: R. H. E., Mr. Morton's, 165, Lewisham High-road, S.E.

FOR slide, with scales, of a rare and supposed new species of *Lepisma*, send well-mounted slide to James Simpson, 15, Prospect-place, Dumbiedykes-road, Edinburgh.

FORTY species of *Hepatica* (named), *F. tamarindifolius*, *G. squarrosus*, *T. abietinum*, *H. hians*, offered for foreign Marine Algae.—E. C. J., 12, Church-road, St. Leonards-on-Sea.

A FEW rare British Birds' Eggs in exchange for rare British Birds' Skins or Eggs, not in collection. All letters answered.—R. Standen, Goosnargh, Preston, Lancashire.

SEND Botanical or prepared Entomological material in exchange for a healthy plant of *Valisneria* and Capsules of *Whelk Egg* for Polariscopes. Other material for exchange.—Tylar, 165, Well-street, Birmingham.

SEND really good unmounted Material of any kind (except diatomaceous earths), when well-mounted Slides or Material (as preferred) will be forwarded in exchange.—J. Sherlock, 32, Exchange-street, St. Helens.

RARE Mosses, including *Tortula Hornschuchiana*, *Hypnum triquetrum*, &c. (all in fruit), for well-mounted Micro Slides.—T. Watson, Bank Parade, Burnley.

WANTED, Lepidoptera (perfect or imperfect insects) for Polyzoa from the Coraline Crag; Eggs, mostly sea-birds', and other objects of interest.—F. M. Ogilvie, Stzewell House, Leiston, Suffolk.

LONDON CATALOGUE, 7th edition, Nos. 135, 209, 239, 556, 577, 704, 709, 769, 810, 838, 975, 1031, 1284, 1297, and others, in exchange for Nos. 1265, 1267, 1270, 1279, 1286, 1292, 1293, 1298, 1299, 1300, 1302. List exchanged. J. Tempère, 23, Crouch-street, Colchester.

In exchange for well-mounted slides, send Fossils or objects relating to Marine Zoology.—C. P. Ogilvie, Stzewell House, Leiston, Suffolk.

WANTED, good gathering of *Pleurosigma angulatum*, for Diatoms, Slides, Material, or Cash.—Eug. Mauler, Travers, Switzerland.

A BOTTLE of Preliminary Varnish, and one ditto of white or coloured Enamel Cement, for good unmounted material. Micro. Fungi, Diatoms, Marine Algae, &c., preferred.—Henry Vial, Crediton.

BOOKS, &c., RECEIVED.

White's "Natural History of Selborne," edited by Prof. Thomas Bell, F.R.S., in 2 vols. London: Van Nostrand.

"Proceedings of the Literary and Philosophical Society of Liverpool," vol. xxxi. 1876-77.

"The System of the World," by W. L. Jordan. London: Hardwicke & Bogue.

"The Freedom of Science in the Modern State," by Rudolf Virchow, M.D. London: John Murray.

"Land and Water." March.

"Chambers's Journal." March.

"Botanische Zeitung." February.

"American Naturalist." February.

"The Naturalist." March.

"Midland Naturalist." March.

&c. &c. &c.

COMMUNICATIONS HAVE BEEN RECEIVED UP TO THE 10TH ULT., FROM:—F. K.—J. F. R.—M. G.—M. H. C.—T. W.—H. B. W.—J. E. J.—F. C. R.—T. E. D.—F. H.—E. W.—E. D. M.—J. H. R.—D. G.—C. J.—D. O.—C. W. L.—Dr. R. H. W.—G. C. D.—H. L. G.—T. McC.—S. C. H.—A. S.—G. N.—C. P. O.—F. M. O.—G. C. D.—H. G. G.—H. L.—G. P.—W. T.—F. W. M.—T. S.—Prof. J. T.—T. W.—W. W. W.—J. H. K.—J. P. S.—R. S.—J. A.—G. W. L.—E. H.—E. C.—J.—M. R. D.—J. S.—E. S. M.—J. L. H.—A. S. K.—E. E.—J. R. S.—F. M.—R. H. E.—R. B. C.—B. H.—H. P.—H. G. W.—S. A. B.—L. H.—C. W.—J. W.—H. W. T.—F. M. H.—T. B.—W. H. A.—E. C.—J. K.—A. B.—T. W. D.—F. A. A.—A. J. R.—S. A.—S.—H. A. F.—X. Y. Z.—A. H. H.—R. W.—Dr. C. C. A.—W. S.—M. K.—E. A.—H. B.—A. B.—&c. &c. &c.



THE MIGHTY DEEP.

By A. RAMSAY.



ACCORDING to E. Forbes and others, it is a convenient hypothesis to assume that each species has arisen from a single centre, so that each species, each genus, and each fauna occupies an area which is complete in itself. Thus, a species

may spread from a particular centre as far as it can find suitable conditions. If such conditions were universal, there is no reason why the species should not spread into every sea and exclude all other forms. There are, however, always restrictions, so that each species has a limited distribution, and if it spreads over most of the space occupied by the ocean, it generally occurs more or less sporadically, owing to alterations of condition having driven it from certain parts. The distribution of each species is, in most cases, a clue to the distribution of the particular set of conditions under which it lives. Hence species which find the conditions for living on the sea bottom in deep water will spread over that area of deep water so far as the suitable conditions are sufficiently continuous. If there is a break in the distribution of such conditions, whether caused by the shallowing of the water or in any other way, the further extension of the species will be arrested. Most marine organisms have powers of locomotion during some portion of their lives, a circumstance which, combined with the transporting power of currents, must not be overlooked. The continuation of the species in time implies the continuance of the conditions suitable to it, a circumstance which should always be present to the minds of both palæontologists and geologists when endeavouring to synchronize old sea bottoms. In all oceans of the present period, and, as may be assumed, in all oceans of past periods, there is and has been a similar concurrence of physical conditions. The main difference in time have been variations in the distribution of each

set of conditions relatively to one another, while both in time and in space these have been accompanied by variations in the facilities afforded to each species in passing from one area to another. This has caused local groupings of species into faunas and floras, and the preoccupation of the ground frequently prevents a species from localizing itself where the physical conditions are favourable for it. This preoccupation is often a barrier to the spread of a species. Generally the persistence of a fauna associated with a particular set of conditions, whether in space or in time, indicates the persistence of these conditions. For instance, during the post-pliocene period, a particular assemblage of mollusks frequented the shallow waters of the British isles. All these, or at any rate nearly all, now occur on the east shore of N. America; while a much smaller proportion exist on the present shores of Britain. Currents will not account for this alteration in the distribution; but the existence of a line of shallow water on a coast extending from the British isles to America would. The destruction of this coast-line and modifications of the conditions on the British shores with the continuance of such conditions on the shores of America would explain the remaining phenomena. This illustration (which is only one of many that could be cited) shows that the occurrence of the same fossils in the strata of two distant areas indicates the occurrence of similar conditions in both areas, but not that the faunas are synchronous: the question of contemporaneity should be based on other evidence. So, again, the relative ages of strata cannot be deduced solely from the similarity or dissimilarity of their fossils. It is essential that the conditions connected with each be taken into account, in order to determine this point. If all the species now living were regarded as fossils, and if local lists were made of them with a view to comparing them with older faunas, some would have a more ancient facies than others; and a geologist would, we suspect, assign them to different periods. Facts indicate that geological provinces existed in past periods analogous to those of the

present; but the knowledge we have of the old sea bottoms is partial, so that it sometimes happens that while the known strata representing one great period indicate the prevalence of one set of conditions, those representing the succeeding one indicate the prevalence of a widely different set. The difference in these faunas is frequently considered to be that of the entire fauna of the two periods, whereas it may really be that of the faunas belonging to different conditions of the ocean of different periods, not the faunas belonging to the similar conditions of those seas. For instance, we know that the fauna of the deepest parts of the Atlantic Ocean of the present period is markedly different from that of its shores; but probably if those species had represented a past period in geology they would have been assigned to different ages, if there were no stratigraphical evidence to prove their contemporaneity. The distribution of a species in time is also assumed to be continuous, so that when it dies out it never recurs again, but its place is often taken by a representative species. Those species which can endure under many conditions generally have an extensive range both in space and in time, and are by themselves of comparatively little use in synchronizing marine strata. Zones and horizons are best marked by the maximum development of one or a few species in association with the same fauna. Such zones are generally of local importance, and do not apply to the whole ocean of the period; and the synchronizing the fauna of different areas is the most important work which the student of the ocean has yet to perform. The sea is a barrier to the dispersion of many land animals and plants; and hence facts as to the distribution of these afford a clue as to the position and persistence of oceanic basins. The geological provinces of the land are usually separated by wide and deep oceans.

Marine and non-marine forms are sometimes mingled in the same stratum. This may be naturally effected in many ways. In deep inlets of the sea, into which rivers discharge themselves, it frequently happens that the surface water is fresh enough for the existence of fresh-water species, while the deeper water is tenanted solely by marine forms. When the individuals die, the fresh-water and marine forms are mingled in the same deposit, and marine fishes may have the remains of fresh-water species in their stomachs. Land shells are sometimes blown on to the shore between tide-marks, and may thus be associated as fossils with the littoral marine fauna. The sea-water flows up estuaries below the river water for long distances; and in many cases the alluvial deposits about the mouths of large rivers are largely composed of marine microscopical organic remains. On the other hand, similar remains of terrestrial forms of life are deposited on the sea bottom as a consequence of dust-storms and dust-deposit generally on the surface of the sea. In many places springs of fresh water well up on the sea bottom both

near to and far from the shores; and as these persist for lengthened periods, it is not impossible that they may be the means of distributing fresh-water remains over a marine area. However, there appears to be no case on record of any species of organisms having been found having such areas for their special habitat; but this may arise from no one having undertaken any search for the express purpose of obtaining such forms, should they exist. As occurrences of this kind (excluding the surmise relative to submarine springs) are known to happen now, we should not overlook the possibility of their having occurred in past periods.

The contour and age of old seas may then be inferred from three kinds of evidence: (1) Lithological, or the superposition, nature and origin of sediments; (2) Physico-geographical, or phenomena relating to elevation and subsidence of the earth's surface, volcanic eruptions, position of land, denudation, and others which need not be specially mentioned; and (3) Biological. The inferred age of any particular sea-bed ought to be based on facts belonging to all three kinds of evidence, and an adequate knowledge of old sea-beds is not attained until we have acquired evidence as to the fauna of the various zones and provinces of each period. Our knowledge of the seas of past periods is but fragmentary; but by attending to the considerations suggested, we shall be enabled to see more clearly where the deficiencies are. Facts as to deficiencies or breaks, whether stratigraphical or biological, are of great importance; such breaks are generally associated with lapse of time, because changes require time for their development; and generally the greater the change the longer is the time necessary to develop it. But such changes are primarily associated with change of conditions, and different conditions may abruptly succeed each other; while similar conditions may recur on the same area after a long interval of time without any intervening strata. Hence stratigraphical breaks do not always coincide with nor are proportional to biological breaks. The cause of such breaks is a matter for inquiry in each particular case, and it is only from data thus acquired that one can judge of the probable lapse of time indicated.

PRIMITIVE MAN :

HIS TIMES AND HIS COMPANIONS.

BY THE REV. J. MAGENS MELLO, M.A., F.G.S.

NO. II.

AS man advanced in civilization, or, as amongst ruder tribes more cultivated ones made their appearance, the forms of his implements became more and more perfect, and better adapted to their purposes. Bone would be at the same time more frequently used; and we have proofs that this was the case in the fact that in the floors of some of our caves, notably in those of Creswell and in the French

caves of St. Martin d'Excideuil, whilst in the lower beds we get the rudest tools made of pebbles or flints fashioned in the roughest way, overlying these in the higher deposits are found more elaborate ones, accompanied by bone needles, harpoons, arrow-heads, and other implements. Another point worthy of notice in connection with these primitive men is that they were not all of them such utter savages as we might have supposed. Evidence has been gathered, showing that even the higher forms of art had followers in those early ages of the world's history; bones skilfully engraved have been found in some caverns, especially in those of the Dordogne in France, and in this country the Robin Hood Cave at Creswell has yielded one solitary British example. On these bones, fragments of rein-deer antlers, or ribs, are seen roughly, yet very beautifully, drawn; figures of rein-deer, Arctic foxes, horses, and even of the great woolly mammoth, all perfectly recognizable, and showing beyond all doubt that the engravers must have been thoroughly familiar with the forms of the animals they drew so well, and that therefore man and these animals must have lived side by side in these countries. These men were essentially hunters and fishermen, and it is not improbable that they lived very similarly, in most respects, to the Esquimaux of to-day; so much so, indeed, that it has even been suggested that these latter may be their remote descendants. These men, then, who chased the rein-deer and the horse, the bison, and the urus in the forests and plains of Northern Europe, and harpooned the fish in its rivers, were the first men of whom we have any positive traces; and because they used as their chief implements those made of stone, they are called the Palæolithic or Old Stone Men, and the age in which they lived is known to geologists as the Palæolithic age. After their age, and when they lived it appears impossible to guess at, great changes, involving a long lapse of time, must have taken place. The climate became milder, England sank lower, and the sea again made its way between us and the Continent, and these islands became, in some respects, what they are now. The animals of the Pleistocene age gradually disappeared; some died out altogether, others, such as the lions and the hyenas, retreated to more southern climes, and some others lingered on for awhile to be extinguished in time by the repeated attacks of man.

A new race of men have now made their appearance; different in their physical conformation, as shown by the shape of their skulls, &c.; different also in their degree of civilization and in their companionships. These were the men of the Neolithic or New Stone age. Stone was still used for tools and for weapons; but the flint or other material was far more skilfully wrought, and it was not only chipped into shape with the utmost perfection, but was also frequently ground to an edge more or less polished.

These Neolithic men introduced into Europe many of the animals which are now familiar to us; the domestic hog, the small ox, called the Celtic short-horn; the sheep, goat, and others. They also brought with them the cereals, wheat, &c.; and so man, from having been merely a hunter and fisherman, at last settled down into a dweller of more fixed habits, and was, in his way, an agriculturist and shepherd; he was also a bit of a potter, rude fragments of earthenware vessels having been found not unfrequently with remains of this period. Neolithic man, although not so essentially a hunter as his predecessors, yet necessarily depended in a great measure on the chase for his sustenance. Hares, horses, stags, oxen, goats, and other animals would supply him with abundant food.

It has been thought, with considerable probability, that traces of these Neolithic men still exist amongst the populations of Europe; the Basques of Spain, and an allied race in the South of France, as well as in Brittany, and the small swarthy Welshman of Denbighshire, and others of a similar type in Ireland, are possibly the remote descendants of these primitive men.

When the next tide of human immigration swept over Europe, it brought with it an art destined ere long to sweep the old stone implements away. The incoming men were those of what has been termed the Bronze age. Their tools, and weapons, and ornaments were largely made of that alloy of copper and tin we call bronze. Poorer people would doubtless continue for awhile to make use of stone implements; but the metal was the characteristic feature of the period. A small race of men were these users of bronze, as is witnessed to by the smallness of the sword-handles, bracelets, and other objects; and judging by this and by symbolical ornamentations sometimes seen in their works, they would seem to have entered Europe from the East, and to have been either an Asiatic or Egyptian race. It may be observed that the Bronze men were in the regular habit of either burning or burying their dead, whose remains are frequently met with in tumuli.

Magnificent weapons were many of these bronze ones. Finely-shaped axes, called celts, swords and daggers of very peculiar and perfect forms, spear-heads, and knives, bracelets, pins, and other ornaments have been found in large numbers in Denmark, in Germany, Switzerland, and Ireland, and in a somewhat lesser quantity in this country. Man by this time had, at any rate, for the most part, forsaken the cave-dwelling for the hut; he had even learnt to build himself villages; these were often, for protection, skilfully constructed on piles, in lakes, or were walled round; the remains of lake dwellings, some of them even belonging to the earlier Stone age, have been found in considerable numbers in the Swiss lakes, and also in Ireland. The man of the Bronze age had become a weaver as well as a potter;

rude fabrics of flax or even of straw have been discovered amongst the relics of his times; and his pottery shows a considerable advance upon that of Neolithic man.



Fig. 66. Flint Dagger (Neolithic), Denmark, $\frac{1}{2}$ size.



Fig. 67. Hafted Implement (Neolithic), Schaffes, Switzerland, $\frac{1}{2}$ size.



Fig. 68. Flint Axe (Neolithic), Denmark, $\frac{1}{2}$ size.

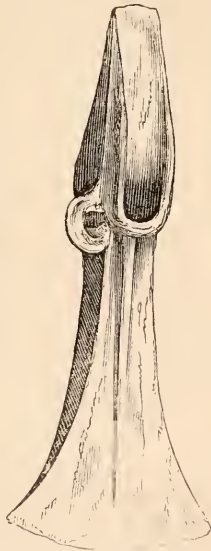


Fig. 69. Bronze Celt (Bronze age) Chesterfield, $\frac{1}{2}$ size.

When the Bronze age passed away, which it gradually did, a new metal gave its name to the succeeding period; that metal was iron, known in Europe, and used before the Roman invasions outside Italy, yet doubtless the Roman armies helped to make its use more common, even if they did not actually

introduce it into some countries. The men of the Iron age may be looked upon as the immediate fore-runners of the men of to-day, who are most undoubtedly users of iron, the metal of our modern civilization.

Thus, then, age after age of man has passed away; who shall say how many generations have lived and died since the days when men, clothed in skins, roamed from cave to cave, as they followed the chase, and contended with the mammoth and the hyæna, and the cave bear, and their congeners?

What a tale of progress has to be recorded since then, what a wondrous history of change! Where the forest and the morass once stretched, waving cornfields now meet our eye; where the savage beasts of prey fought over their victims, the flocks and the herds of our domestic animals peaceably feed; and man has ever advanced, step by step fighting his arduous battle, and he has won victory after victory, over nature, over circumstances, over himself, fulfilling his lofty mission of Lord of Creation. And as man has advanced in civilization, ever-increasing powers seem to have been made his own, as it has been well shown, new sources of strength, new means of overcoming the difficulties of his position; nay, even new senses may be said to have been put within his reach. The telescope and the microscope have given him new eyes; the printing-press has given him new ears with which to hear the voices of all ages; machinery has given him new hands. Thus shall man press forward, we may surely hope, out of all the darkness of the past; and at length emerge through the struggles and imperfections of time into the perfection of eternity.

ORNITHOLOGICAL ESSAYS.

NO. I.—THE KESTREL.

(*Falco Tinnunculus.*)

By T. W. DEALY.

GENERAL INTRODUCTION, HABITS, ETC.

THIS well-known and widely-distributed little falcon is often confounded with the Sparrow-hawk (*Accipiter nisus*), and has often to pay the penalty of death for the pillaging attacks of that noted farm-yard devastator. It is counted by the gamekeeper and agriculturist as "vermin," and a great destroyer of game and bird life generally, while, in reality, it is one of their staunchest friends, as it rids them of the numerous mice, beetles, reptiles, &c., which otherwise would injure the crops. Although the Kestrel is such a great destroyer of mice (thus benefiting the farmer), it is a hawk, and for this reason the land must be rid of it. We have often heard of the land being overrun by multitudes of

mice, beetles, and such like, when this or other equally useful birds have been so ruthlessly exterminated; but I have just read of a warning to all farmers. It has been stated that the borderlands of Scotland are being overrun by immense numbers of mice, the smaller mammalia, beetles, and such like destructive creatures, and that the farmers there are encouraging these hawks to stay, being now fully convinced of the folly of destroying them.

The Kestrel has a great number of provincial names, but the one by which it is commonly known is that of "Windhover." It acquires this suitable appellation on account of its hovering or poising itself on outstretched wings in mid-air. In Sweden, "Old Bushman" says it is named the "Torn falk."

It may easily be seen that the Kestrel is not the bird's enemy whenever one appears in the vicinity of a flock of birds, for, instead of the hurry and precipitation so apparent on the approach of that dreaded little tyrant, the Sparrowhawk, the birds quietly pursue their peaceful duties, as if there were nothing extraordinary or to be feared in the Kestrel's presence. At times, Swallows (*Hirundinæ*), actuated by playfulness or a desire to tease and torment the "Windhover," will mob it in the same manner that they do the Sparrowhawk, and, like the latter, it will sometimes retaliate, and, from being pursued, will itself become the pursuer.

Keepers place traps in likely situations, near the nest and elsewhere, in which to entrap this bird. A keeper in the habit of doing this, on going his daily rounds to visit his traps, perceived a Kestrel in one of them, which, on seeing him (not liking the prospect of having its neck twisted), made strenuous exertions to regain its former freedom, and was so far successful that it escaped, leaving, however, about half of one of its legs attached to the trap.

The "Windhover" may easily be distinguished from the Sparrowhawk: (a) by its hovering in the air, which the latter does not practise to such perfection as the former; (b) in straightforward flight it has neither the dash nor the rapidity so noticeable in the Sparrowhawk. It flies along gently, while the Sparrowhawk sweeps rapidly on, now swooping at this, then at that. (c) When seen off the wing, the "Windhover" is also easily known by its inclined and rather stooping posture, while the Sparrowhawk stands "as straight as an arrow," bidding defiance to everything by all its movements and actions. Even the uncouth country-lad can perceive the difference between these two, for, on asking a little rough-headed boy on the outskirts of Sheffield if there were "any hawks about there," he replied, "Which hawk do you mean; the one which catches pigeons, or the one which stands still in the air?"—by the former, meaning the Sparrowhawk, and the latter, the Kestrel. The Kestrel takes great delight in tormenting other birds,—above all, the Owl

(*Strigide*), which appears to be the "laughing-stock" (if I may so use the expression) for all birds. The cry of the Kestrel is a strong, wild, ringing note, which becomes harsh and loud on the threatened approach of any danger to either its young or its eggs.

FLIGHT.—The flight of this bird is very light and airy. Generally, it flies at a moderate distance from the earth, but during, or rather on, the choice of a building site it soars high up in the air, when its actions are most elegant. The question then arises, "What is the Kestrel's object in soaring so high?"



Fig. 70. The Kestrel (*Falco tinnunculus*).

"Is it seeking to discover food from so great an altitude?" No. It is the joyousness of the bird which prompts its lofty flight and graceful evolutions so high up in the heavens. When on the "look-out" for sustenance it flies at a moderate elevation, that it may drop down suddenly and unexpectedly on its prey and secure it before it has sufficient time to escape. If the "Windhover" attempted to descend (even were it possible for it to discern its prey from the great height to which the Kestrel often ascends) its intended victim, startled by the rushing noise which the bird's velocity causes in descending, would have time to escape the talons of its would-

be captor. Kestrels are very early risers, and are busily employed procuring food almost as soon as night rolls back her gloomy mantle and the wide east is tinged with the rosy hues of the rising sun, and pursue their vocations until it becomes dusk; and even then, long after the brilliant orb of daylight has disappeared in the far-away ruddy west, and the soft twilight of a summer's evening has overspread the country, they may be seen lightly skimming over the surface of the earth in search of food. As the compact body, great extent of wing, and fan-like tail of the Kestrel indicate, it has great command of itself in the air, making long sweeps and elegant curves in the ethereal regions. It is, indeed, a beautiful performance, and one we all delight in witnessing on a fine, clear summer's day, the Kestrel, quite at its ease, with nothing in the blue sky above but itself; its movements so unconstrained, and withal so replete with joyousness, as it revels in the celestial atmosphere in perfect harmony with the surrounding landscape. The wings and tail are expanded, and seem scarcely to move as their owner ascends and descends in graceful curvets. Now it takes a longer and a higher sweep than usual, and then, coming low, keeps on circling, now here, now there. Suddenly it stops! Probably it caught a momentary glance of some small animal! No! It again resumes its flight, again it is wheeling majestically aloft! It hovers again! What a beautiful object! How pleasing are its actions, as it "stands anchored," as if suspended by some invisible cord from on high! Its head is turned a little on one side, its tail spread out like a lady's fan; it is watching with its keen eye some small animal it intends to catch, probably a field-mouse little aware of the fatal danger which menaces it. In what fine style it comes down on that unfortunate mouse, which it soon bears away in its talons, to its craggy fastness in yon distant wood, there to be torn to shreds by four or five hungry young "Standgales." When the Kestrel is hovering, its wings, although to the naked eye they do not appear to move, are in a perpetual quiver. Suppose the Kestrel be unsuccessful in one attempt, it repeats its efforts, and so on, until it reaches "home." But there is not a field, valley, pasture, or any place at all likely to furnish it with food, which it passes without a strict search. The beauty, smoothness, and facility with which all these evolutions are executed are beyond the power of the pen to adequately describe. No! You must go and search for it amidst its haunts, and watch it in its retreats, before you can fully appreciate the character of this bird. Sometimes we can just discern it like a mere speck on the horizon winging his way slowly under the clear, blue canopy of heaven. At other times it moves along at an immense height until it disappears beyond the verge of the distant horizon. In fact, on the wing, this bird appears indefatigable.

What would be the value of scenery were it not enhanced by the presence of birds? How dreary and desolate, how desert-like would be the vast expanse of heather-covered moors without the hoarse cackle of the Red Grouse (*Tetrao Scoticus vel Britannicus*) or the Curlew's (*Numenius arquata*) solitary cry! What would be the aspect of our woods were we not in Spring-time, and, indeed, throughout the Summer months, to see the Kestrel hovering over its leafy bowers; or what of such diversified scenery as is to be met with in and about the "Peak district," were we not to meet with the "Standgale" amidst its fastnesses; or of the lakes, were not the still solitudes to be awakened by the splash of the water as the Coot (*Fulica atra*) or Moorhen, startled by the intruder's presence, dashes away to gain shelter among the many islets which dot its surface; or the shrill piping whistle of the Sandpiper (*Totanus hypoleucos*) as it hastily wings its way across the watery expanse, to some other part? Were the world to be deprived of birds, it would lose one of its most powerful charms.

MIGRATION.—We have now arrived at the most interesting, but, at the same time, vexing portion of the history of this bird, viz., its migration. Does the Kestrel migrate wholly or partially from Britain? or does it merely move to other localities in our island more congenial to its habits? I have been much interested in this question, and have studied it deeply,—at least, as regards the immediate vicinity of Sheffield. It has proved a most interesting study. We all know what a distinctive feature are the elegant aerial evolutions of this bird in our summer scenery, and how blank seems the wood which is not inhabited, or, at the least, its neighbourhood frequented, by a pair, or more, of these beautiful little falcons. After the breeding season, when the young have been reared and are able to fly, we see them very often hovering over the waving golden corn-fields, or otherwise engaged in search for food. Then, after a brief interval, they suddenly disappear without any warning, and we do not again see them until their appearance in early spring. The period of departure, or migration, varies, according as the weather regulates. If winter sets in early, they "go away" about the latter end of September, but if the season be fine and open, they may prolong their stay until the earlier portion of October, and by the end of that month not one is to be seen. Whither are they gone? Happily the days have gone by when people were deluded by the supposed fact of birds hiding in holes, and there remaining in a dormant condition until spring's verdant call awoke them. There is but one conclusion. It was Charles Waterton's opinion that the majority of these birds migrate to other more southern countries, leaving here, according to his observations, about October. He had excellent opportunities for the observance of their habits, and yet he never saw them in winter after their final departure. Certain it is that we see but very, very

few of these birds from October to the middle of February. In my opinion, they do migrate wholly to other countries. Coming from the North and joining those in the south of Britain, they assemble, cross the Dover Straits, and, although numbers may stay in the provinces of central France and northern Spain, I have reason to believe that the immense majority cross the Mediterranean along with the numberless birds that periodically do so, to the northern shores of Africa, whence they commence their return during the month of January, arriving in Britain in the course of the succeeding month. The few (and they are but few) exceptions met with during the winter months only tend to prove this, and we must treat their appearances as those of the casual swallows which often appear at unseasonable periods.

FOOD.—As I have before said, this bird is not so destructive to poultry or game as is the sparrowhawk. It is also a much more sociable bird, and is more frequently seen near the habitations of man than the former. Its food consists of the smaller mammalia, such as rats and mice, also beetles and other destructive insects. Charles Waterton says that it consists “almost entirely of mice.” For the vermin this bird destroys, its life should not be sacrificed as it is by gamekeepers, who, almost without exception, seem to have the most ungovernable aversion to all kinds of hawks. A great observer of the economy of birds, Mr. Booth, says, “The rats alone which these birds destroy while procuring food for their young would commit more, ten times more, damage in one year than a pair of Kestrels could in their joint lives.” The Windhover does, indeed, occasionally have a change in its diet in the shape of a small or unfledged bird, and, as sure as it does so, it is either caught or seen “red-handed” by the keeper, who, having seen its partiality to birds, *firmly believes* that all its food consists of such, and, acting on this illusory belief, he exterminates this really useful little hawk and points out with evident satisfaction the ominous row of Kestrels suspended in a conspicuous position in his “museum.”*

Mice are swallowed whole, the indigestible parts being afterwards cast up in the form of pellets. Insects are dexterously caught while on the wing, being clutched with either foot and adroitly conveyed to the mouth without at all impeding the flight.

REPRESENTATION IN OTHER COUNTRIES.—Though not found in Australia, the Kestrel's place is well supplied by the Nankeen Kestrel (*Tinnunculus cenchroides*, Gould). As before mentioned, the Kestrel's flight is very buoyant, but what must that of

its Antipodean representative be, of which Gould says, “The flight of the Nankeen Kestrel differs from that of its European ally in being more buoyant and easy”? In North America this bird is partially represented by the American Sparrowhawk, which partakes of the character of both the Kestrel and the Sparrowhawk.

DISTRIBUTION.—It is the commonest of the Falconidæ which frequent our isles. Charles Waterton had numerous Kestrels in his park; he, himself, visited in 1835 no less than twenty-four nests, all having Kestrels' eggs in them. I have never since heard or read of so many being found in so small a space, but, of course, he had them strictly preserved. Around Sheffield its nest is not found as frequently as that of the Sparrowhawk, although I have seen the bird oftener. In many parts of Lincolnshire it is also very common. It is very frequent in Scotland, breeding mostly on the precipitous and craggy rocks which fringe its shores. In Ireland, Mr. Thompson says, “It is common and indigenous to suitable localities throughout the island.” It is found in most European countries, even as far north as Lapland, where “Old Bushman,” in his trip up there in 1862, procured specimens of both skins and eggs of this bird. Specimens of it have also been sent from all portions of Asia and Africa.

NIDIFICATION.—One cannot fail to be struck by the facility with which the “Standgale” adapts itself to places of nidification. In sylvan localities it constructs its nest mostly on a tree, but if the spot chosen be a wild, mountainous, but picturesque district, either on the coast or in the interior, it will be placed in some crevice in the rock. Sometimes the nest is placed in the interstices of a dilapidated old barn, or, perhaps, it is situated in a church tower. The rough and hastily-composed structure which serves for a nest is quite adapted to the contiguous wildness. The “Stannellhawk” is but too glad to avail itself of the deserted nest of any of the *Corvidæ* family; that of the Magpie (*C. pica*) or the Carrion Crow (*C. corone*) being generally chosen. If the country be favourable, the nest is placed on some precipitous “scar,” from which the Kestrel may have a view of both his enemies (should any ever assail him) and his prey.

Dovedale, in Derbyshire, is noted for the number of Kestrels which frequent and nidificate on the rock surrounding. The bird does sometimes build itself a nest: it is composed of sticks outwardly, the inner portion of twigs lined with, perhaps, a little moss, a few dead leaves, or, maybe, a little wool, often no lining at all beyond the twigs, and is erected at the commencement of April.

The eggs, which are laid from the middle of April to the end of May, are four or five in number; very beautiful in appearance. They are of a pale reddish-brown ground colour, marbled and mottled all over with a darker red. In some varieties, the ground-colour is of a white, delicately suffused with a faint

* I notice in the *Zoologist* for April a remarkable instance of this. On p. 120 of that periodical Mr. W. A. Durnford, writing from the Lake district, says: “A kestrel rose from the embankment within a few yards of me, with a large object in its claws. . . . It dropped its prey, which on examination proved to be a full-fledged young cuckoo, dead, though still warm.”

blush red, the spots being distributed so scantily as to give it a slight resemblance to a Sparrowhawk's egg. Other varieties have a zone of a darker hue encircling either ends. I have at times seen eggs of this bird of a light yellowish-brown, with spots so few and minute as to resemble a strongly-marked specimen of the Red-legged Partridge (*Perdrix rubra*). It is a well-established fact that there is generally one egg in the "clutch" much smaller than the others. This, however, may be explained by its being the last egg, and the producing organs in the female having been weakened by previous exertions. In due time the eggs are hatched, and on the appearance of the young, the energy and watchfulness displayed by the parent birds are extreme. Generally they are both to be found in the vicinity of their young, and are never absent together, one (probably the female) being continually with the young, attending to their requirements, and rigorously guarding them from all intruders; while the other parent is occupied in procuring food, of which there is always an abundant supply. Their only real enemy, and of whom they have most fear, is man. Should a person invade the precincts of their territory, and threaten their precious "citadel," the vigilant guards always give the invader due warning by uttering a shrill, piercing cry. Should the hard-hearted fellow take no heed of this, but be intent on robbing the nest of its young occupants, the parents, on the too near approach of the robber, fly up from their resting-place and sail around, out of immediate reach of danger, uttering the while a shrill, plaintive note. Sometimes either of them will make a swift descent at the intruder's head, it would seem, but, checking its course, will sweep rapidly past at a short distance overhead, making a loud rushing noise.

The eggs of this neat-looking hawk stand at the head of the schoolboy's collection. When he is in possession of one, he is satisfied, and congratulates himself on his "luck," and on hearing of any one of his schoolmates having a rival collection he immediately sets out to view it. The first question asked by him is, "Have you a Kestrel's egg?" If the answer be in the negative, he thinks absolutely nothing of the collection,—in fact, treats it with contempt, tells the owner of it about *his* Kestrel, how and where the egg was procured, and finally departs, thinking he has made an impression on his brother collector.

The Kestrels, both male and female, are very assiduous in their attention towards their offspring, keeping them sufficiently supplied with nourishment. Space will not allow of me to describe the birds, but they are so well known that it is almost unnecessary.

THE "VETERAN EEL."—Replying to J. J. Newton; the veteran eel, when I bought him in London, was not quite three inches long, and at his death he was eighteen inches long, so that he grew fifteen inches in twenty-two years.—*Ben Plant.*

WHAT A DIATOM IS.*

BY MONS. JULIEN DEBY,

Vice-President of the Belgian Microscopical Society.

(Translated by F. Kitton, Hon. F.R.M.S., Corresponding Member de la Société Belge de Microscopie.)

BY the kind permission of M. Deby I am enabled to place before the readers of SCIENCE-GOSSIP a translation of a very interesting paper on the above subject, read by M. Deby before the Microscopical Society of Belgium. The attention of foreign diatomists has lately been directed to the elucidation of the life history of these remarkable organisms, in some instances with the hope of constructing a natural system of classification. Herr Pfitzer, of Bonn, and Mons. Petit, of Paris, have both published treatises on this subject.†

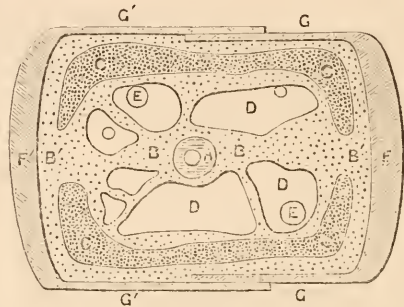


Fig. 71. Ideal section of a navicula: A, nucleus and nucleolus; B B, protoplasm; B' B', primordial utricle; C C, endochrome; E E, oil globules; F F', valves; G G' G', connectives; D D, central cavities.

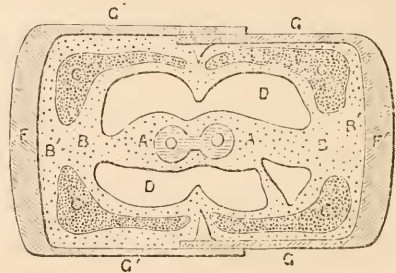


Fig. 72. Section of a diatom commencing deduplication: A, nucleus commencing to divide, with two distinct nucleoli; B, protoplasm; B', primordial utricle; C, endochrome; D, central cavities; F F', valves; G G', connectives.

Mons. Deby's little treatise is devoted to a description of the living diatom and its mode of growth. Of all the forms of unicellular plants, the diatom is probably the most remarkable, not only on account of its siliceous shell, but also for its mode of reproduction.—F. K.

* "Ce que c'est qu'un Diatomée?" par Julien Deby, Vice-Président de la Société Belge de Microscopie. Extrait des Bulletins de la Société Belge des Microscopie pour 1877.

† "Untersuchungen über Bau und Entwicklungen der Bacillariaceen," von Dr. E. Pfitzer.
"Un Essai de Classification des Diatomées," par Paul Petit.

WHAT A DIATOM IS.

The little microscopic organism of which we here propose to say a few words is distinguished from the unicellular algæ, properly so called, as well as from the animals of the class Infusoria and the Rhizopods, by very distinct characteristics. They constitute one of those numerous links between that which one is apt to consider (very empirically) as forming two distinct series in nature, known as the Animal and Vegetable kingdoms; grand divisions that are only separated one from the other by the traditions of the first fathers of biological science. In their time the studies of anatomy, biology, physiology, and morphology, did not exist, and the philosophical idea, relating to life, was presented to us under a very dim veil, of which the microscope has only very recently succeeded in raising the corners.

An isolated diatom reduced to its simplest form is composed, according to our view :—

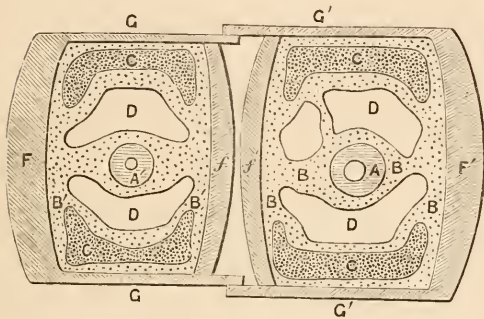


Fig. 73. Section of a diatom undergoing deduplication : A A, new nucleus and nucleoli ; B B, protoplasm ; B' B', double primordial utricles ; C C, divided endochrome ; D D, central cavities ; F', external mother-valve ; F, internal ditto ; f f', new young valves ; G G, connectives.

1st. A central nodule, or nucleus, more or less apparent, colourless, formed of living matter of dense protoplasm in the interior of which a nucleolus may generally be detected (fig. 71, A).

2nd. A mass of the protoplasm less dense (fig. 71, B B), surrounding the nucleus, very finely granulated, which form a certain number of prolongations, which extend up to the limits of the internal cavity of the diatom, sometimes under the form of two large bands, sometimes under that of radiating filaments, which sometimes anastomose and are of various diameters.

Under favourable circumstances an amœboid circulation, analogous to that seen in the cells of Spirogyra and in the hairs of the Urticaceæ.

3rd. A closed vesicle, more or less dense, transparent, and of the same composition and texture as that of the mass surrounding the nucleus, and that may be considered as an effusion of the branchings above mentioned. It is the primordial utricle (fig. 71, B' B'). Its thickness is considerable at the two ends of those diatoms whose axes are lengthened.

4th. A material of a golden-yellow or brown colour,

known under the name of diatomine, or a mixture of chlorophyl and phycoxanthine, and which constitutes the endochrome (fig. 71, C C). This material is placed in the substance of the primordial utricle, which entirely surrounds it. It often forms (according to the species) one or more bands, continuous or interrupted, sometimes the granules are more or less rounded and scattered, or radiating.

The endochrome is subject to periodic changes of position, at certain epochs in the life of the diatom, dragged by the movements of the entire substance of the primordial utricle. The diatomine is evidently analogous to the chlorophyl of ordinary plants, of which it possesses many of the chemical and most of the spectroscopic characteristics.

5th. A central cavity (fig. 71, D D), surrounding the nucleus, and limited exteriorly by the primordial utricle, and which contains—

(a) A limpid, colourless fluid.

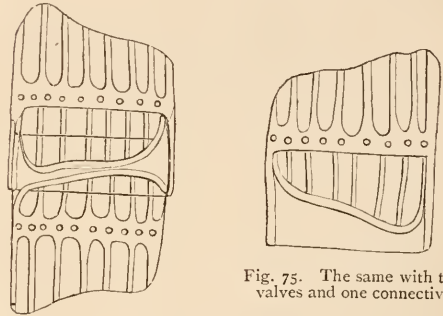


Fig. 74. Diatom (*Isthmia*) formed of four valves and two connectives.

Fig. 75. The same with two valves and one connective.

(b) Drops of an oily nature, coloured or colourless, and highly refractive (fig. 71, E E).

(c) Granules of a nature not determined.

6th. An external protecting envelope formed of cellulose strongly impregnated with silica, secreted by the primordial utricle (which it invests) in a peculiar manner during the life of the diatom.

This envelope is never simple, as in ordinary cells, but is composed of two distinct opposed valves (fig. 71, F F), representing the lids of a little pill-box, and of one or two rims which adapt themselves to these valves, without, however, forming an intrinsic part of them, in a similar manner to the sides of the pill-box. These rims have received the name of *connectives** (fig. 71, G G). The valves and connectives form what is called the *frustule*.

The living diatom must be considered as an organism in which the interior is in conformity with many other unicellular organisms, but in which the protecting envelope is siliceous and formed of several

* This is the connecting zone, cingulum, or Gurtelband of various observers : we shall here use M. Deby's term.

parts, and which we meet with nowhere else in nature, and which distinctly defines these forms.

The only communication between the surrounding fluid and the interior of the diatom exists at the margins of the connectives, and probably in certain cases at their line of junction with the corresponding valves; and always in the form of linear sutures, visible only under the most powerful of our modern microscopes. We shall probably never be able to find pores or openings, properly so called, in the diatomaceous frustule, in spite of the assertions of certain microscopists: this is an illusion.

Solid matter never penetrates into the interior of the living diatom: they drink, but eat not.

(Since the above was printed, M. Deby tells me he is not quite certain that the communication between the external fluid and the interior of the diatom is at the margins, it may possibly exist, particularly in those forms possessing a median line at the terminal nodules: this will be referred to further on.—F. K.)

The movement, so curious, active, and conspicuous in certain diatoms (the principle upon which it depends is nevertheless obscure), manifests itself along the sutures, as before noticed. It is also true, that if by some cause the movement of a frustule is arrested by some immovable obstacle, the movement is reversed.

It is generally admitted, that when once a diatom becomes free, the valves increase neither in length nor breadth. The connectives, however, continue to increase by means of fresh accessions of silica around their free margins, secreted by the primordial utricle: this growth is necessary for deduplication (self-division), as we shall see further on.

The valves of diatoms are very often composed of several siliceous layers, closely superimposed, and presenting various forms, according to the genera and species, and bearing on their surface the sculpturing that ornaments them, and of which the varieties are very numerous, and the design generally very elegant. The connectives are also often furnished with similar designs, but more simple.

We will not now enter into the question as to the intimate structure of the markings on the surface of the valves of the diatoms, some of which defy our most powerful objectives. The simplest form of diatom frustule is composed of—

- 1st. A superior valve (fig. 71, F').
- 2nd. An inferior valve, sometimes differing from the superior (fig. 71, F).
- 3rd. A connective adapted to the superior valve (fig. 71, G'G').
- 4th. Generally a connective adapted to the inferior valve (fig. 71, GG).

One of these connectives slides within the other, like the draws of a telescope, and can be separated.

We must consider all diatoms as organisms, formed of two distinct materials, one of which is *living*, viz.

the protoplasm, the other non-living. The first alone is able to produce the second; that is to say, the endochrome and the oily corpuscles in the interior; and exteriorly, the cellulo-siliceous frustule, with the various supplementary appendages which we meet with under the form of stipes, tubes, mucous cushions, gelatinous envelopes, &c. The endochrome of diatoms, like the pigment found in animals, or the chlorophyl in plants, has not the power of secreting the secondary products; being themselves formed materials, their rôle is in connection with the functions of respiration.

Deduplication (self-division).—If a diatom is examined when the connective is turned towards the observer, we perceive that it increases longitudinally by accretions at the margins of the connectives; at the same time, at the extremities of the frustule, a fold may be seen in the primordial utricle. (This fold is not at the extremity of the frustule, but at the extremity of the connective of the inferior valve.—F. K.) This fold gradually approaches the central cavity, and is prolonged by degrees until it reaches the nucleus, which it divides in two, if it has not done so before. The opposing edges of the fold continue to approach each other, and at last unite, and the point of contact is obliterated at the place where we originally saw the nucleus, and which is completely separated (fig. 72). At this time there exist in the interior of the diatom two contiguous primordial utricles, each possessing a nucleus, which quickly becomes central. In each nucleus may be seen a nucleolus. As soon as this phenomenon is accomplished, both external surfaces of the new utricles commence secreting a siliceous covering, which quickly thickens, and is covered with the design proper to the species, and speedily assumes the form and aspect of the old valves (fig. 73). The new interior valves occupy a central position in the frustule, and are face to face.

We have seen a diatom formed of four valves, when the two old external valves and the two new internal ones were close together; the new valves were supported all round the circumference by the connectives of the original valves.

Soon after—sometimes even before—the parting of the primordial utricle, we perceive that the connectives are considerably enlarged, and at the same time the interior slides in the interior, and by this means separating the two valves to a considerable extent; thus augmenting the dimensions of the internal cavity of the frustule. The connectives of the young valves are not developed until later on,—sometimes before their liberation, and sometimes after, according to the genera and species of the diatom.

Later on, the sliding of the connectives in the species whose frustules live isolated, attains its maximum; the nucleus liberating itself entirely from that which had served it as a sheath.

From what we have just said, we may meet with

the same species of diatom, according to its state of development,—individuals possessing

- | | |
|---|--|
| (1) Two valves, a connective, and a nucleus (fig. 75). | } Simple state. |
| (2) Two valves, two connectives, and a nucleus (fig. 71). | |
| (3) Two valves, two connectives, and two nuclei (fig. 71). | } States of deduplication more or less advanced. |
| (4) Four valves, two connectives, and two nuclei (figs. 73 and 74). | |
| (5) Four valves, four connectives, and two nuclei. | |

Sometimes the external connective is fragile, and is detached spontaneously. This is a fact that must be taken into account.

It is also well to note that the protoplasm of the primordial utricle generally moves to the interior of the siliceous envelope, first at the commencement of the deduplication, and again after the termination of that phenomenon, dragging with it the endochrome, and that these movements of the colouring matter vary in character according to the families and genera of the diatoms.

When a diatom is divided into two parts by deduplication, the endochrome is also separated into two, in order that it may be equally divided between the two utricles.

Every frustule, as we have seen, consists of an old valve (fig. 71, F', fig. 72, F') originating from the primitive frustule, and a new valve of later formation, and whose connective when developed will slide in the connective of the old valve. It follows from this, that in the great majority of the genera of diatoms, when the connective is of the exact breadth of the valves, or even inferior to them in diameter, all deduplication must lead to a diminution of the dimension of the new frustule equivalent to double the thickness of a connective. The thickness of the latter being known, we are able *a priori* to determine the size any descendant of a frustule will have after a determinate number of deduplications. The act of deduplication, considered only in connection with the primordial utricle, is analogous to that which takes place in the majority of vegetable cells, and we may therefore consider every series of diatoms proceeding from a primitive mother-cell as forming in reality only a single whole—a single plant, if you will.

In those species which form permanent series (filaments) where the frustules produced by deduplication never separate one from another, this is very obvious, but those species in which they become new frustules become detached, and live free or isolated; only the eye of the philosopher can recognize the analogy.

(To be continued.)

HOW TO MAKE AND COLOUR CASTS OF FISHES.

By J. E. TAYLOR, F.L.S., F.G.S., ETC.

OF all the natural history objects intended to be preserved, perhaps none have been hitherto more difficult than fishes. Either they were preserved in spirits in glass bottles, in which case they were scarcely visible in the sherry-coloured liquid, or they have appeared in the stuffed state as the most grotesque of caricatures. Nothing can be more strongly contrasted than the supple and graceful forms of fishes in their native element, and the stiff and angular specimens in our museums which have been "stuffed." Of all skins, those of fishes are least amenable to the animal preserver. They stiffen and set sooner than any other, and he is obliged often to turn them out, not as he would like, but as well as he can.

Some years ago, the really fine specimens of coloured casts of fishes placed in the South Kensington Museum, under the direction of Mr. F. Buckland, drew the attention of all lovers of fishes to the new method of preparing specimens. Those exhibited by Mr. Buckland are still so like life, both in colour, marking, and the graceful supple outlines characteristic of fishes, that the observer is some time before he is assured they are not *real* fishes he is looking at. Every scale, fin, and ray is in its place; and a brighter and more attractive set of natural history objects it would be impossible to arrange. It should be understood, however, that these are merely casts, for which the fishes themselves have supplied the moulds. We are not aware that Mr. Buckland, or any one else, has ever published a description of how these casts are prepared. Some time ago, when desirous of learning the secret, we made all the search we could, but failed to find anything beyond an allusion. Since then we have experimented and blundered until we have attained some degree of success, and now have the pleasure of laying before our readers the benefit of our experience.

Let us observe that the student will find fish-casting both a pleasant and profitable recreation from sterner studies. It is artistic enough to require the good taste of the most educated, and being as cleanly as any cooking operation, there is no reason why ladies should not engage in the work as well as men. Moreover, it is cheap, and a little practice and skill will soon enable any one to take natural casts of fishes, and to colour them well enough to be far better natural history ornaments for halls and rooms than the cases of stuffed birds we often see hung in such places.

The first thing is to get some well-ground plaster-of-Paris. We have found that the second quality is better for fish-casting than the first, as the latter sets too quickly. The fish whose cast is intended to be taken should be as fresh as possible. Fish stiffen

THE NATTERJACK TOAD.—The Natterjack Toad may be found on the west coast, near New Brighton, Cheshire, amongst the sand-hills between Midston and Liscard. The eggs of this interesting and uncommon toad appear, in their early stage, like a string of beautiful pearls.

after being taken out of the water, and become too limp afterwards. If it is not convenient to take a cast of fishes immediately, then, if fresh-water fish, they should be packed in plenty of damp moss, and if sea fish, in soft seaweed, and kept in the dark. Before casting, fish should be washed by letting the water from the tap flow over them a few moments. They must not be rubbed with a cloth or otherwise, as the scales are apt to come off. The fish should then be laid on a smooth

bevel away the plaster which has so run under and about it as to prevent its easy extraction. But a little patience and experience will suggest to the student how to proceed in such cases.

The fish having been taken out, there remains its perfect mould, showing every scale and fin. The mould should now be put away in a dry and warm place for several days; indeed, until it gets perfectly dry. It may then be brought out on the working-table, and propped up with paper or anything else,

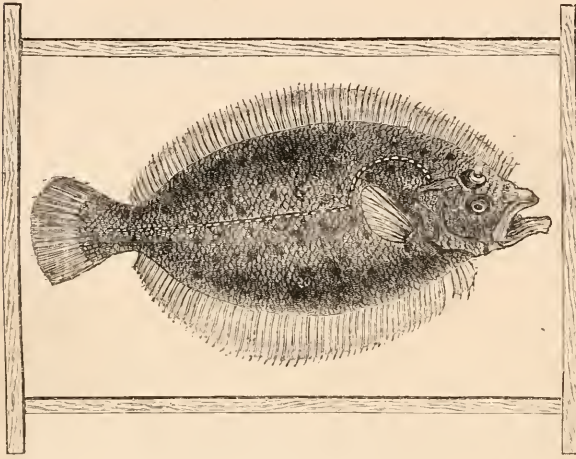


Fig. 76. Brill, laid on table and enclosed in thin wooden bars ready for plaster of Paris being poured over.

table or planed board, perhaps on a newspaper is best, as the lime will not then adhere to the wood. It must be laid out according as the taste of the operator may suggest, so that the cast of it may look as like life as possible. Four bars of wood should then be arranged, as in fig. 76, so as to include the fish as in a frame. When the plaster-of-Paris is poured over the fish this loose framework will prevent the lime from running about. The plaster-of-Paris should then be mixed, the operator judging of the quantity required. At first he will undoubtedly mix too much or too little, but a very short experience corrects this. It is best to mix the powdered plaster under a water-tap, and to have the water gently trickling whilst the lime is being stirred with a wooden spoon. When it has attained the consistency of thick cream, shut off the water, and with all possible despatch pour the mixture over the fish, and the space within the frame as well. The fish need not be covered to a thickness of more than half an inch. The fish, embedded in its plaster covering, should then be left where it is for a few hours. By this time the lime will have thoroughly set, and the entire mass can be easily turned over, for the newspaper has prevented the lime adhering to the boards. The paper is then torn off, and the fish carefully extracted. This requires much care; and perhaps the operator will have to cut or

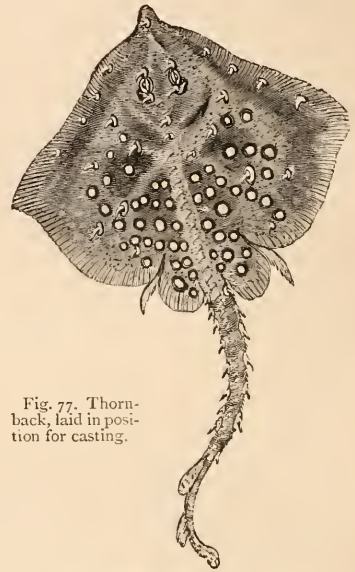


Fig. 77. Thorn-back, laid in position for casting.



Fig. 78. The Flounder, laid in easiest position for casting.

with the concavity left by the fish uppermost. This hollow should then be well anointed with a strong and tolerably thick solution of soft soap. We have found that it answered better than anything else. The soap should be gently and delicately rubbed over the interior of the mould with a large and dense camel-hair brush, so as not to rub off any of the sharpness of the impressions left by the scales, &c. The flat surface of the outside of the mould, where the liquid plaster flowed within the space of the frame of wooden bars, should also be equally well anointed with the interior.

The mould having been made as firm and steady as possible, the operator now mixes another batch of plaster-of-Paris. At first it is best to mix too much rather than too little, for if there is too much it need not be all used, but if there is too little the cast will set whilst more is being mixed, and the entire labour may thus be lost. The plaster should be of about the same consistency as when it was used for making the mould. It is poured into the latter gently and evenly, until it is completely filled, and the process is continued over the square-bar space, until it covers the latter, say an inch in thickness. By means of a trowel, or any other tool, the plaster is smoothed down to an equal level. With a knife, the overflowing plaster should then be pared off before it sets hard, so as to be flush with the square sides of

When the mould has at length been stripped off, the operator has the perfect cast of the fish as first laid down. Every scale and fin is present, whilst the space between the movable wooden bars (which we recommended should be covered over on the mould) is now a square background, from which the cast of the fish stands forth in high relief. A little trimming and truncating of the edges makes it perfect. Any cavities left either in the cast or the base to which it is attached, may now be filled up and smoothed down. Sometimes the tips of the fins break off when peeling away the mould. In that case the student must repair them as best he can, by adding a little plaster, and carving it down when dry. The feelers or barbules of such fish as Cod, Whiting, &c., may best be imitated by fixing a little copper wire into the under jaw of



Fig. 79. Position of Pollack Whiting for casting.

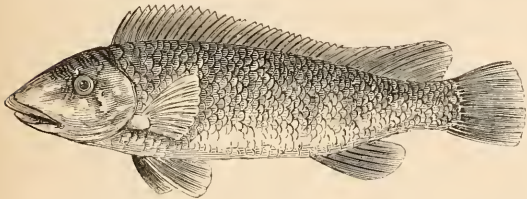


Fig. 80. Ballan Wrasse, with fins spread out, ready for casting.

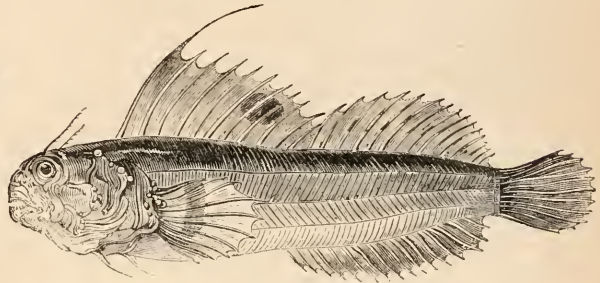


Fig. 81. Butterfly Blenny, showing expanded dorsal fin.

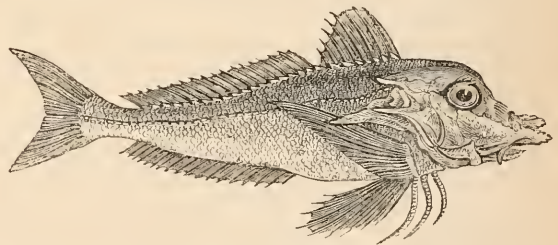


Fig. 82. The Piper Gurnard (*Trigla lyn*), showing separate rays of pectoral fins.



Fig. 83. Three-bearded Rockling, showing barbels on mouth, which have to be imitated with wire.

the mould. Both mould and cast must be put away for a day or two, after which the task of taking off the mould may be commenced.

Perhaps, in setting, the heat of the larger quantity of plaster which has been employed in making the cast will have cracked the mould. If so, it is advantageous, for each mould can only be used once; if the fish operated on be a rare one, it is best, therefore, to take several moulds of it. Of course, a good deal depends on the shape of the fish as to how it shall be extracted from the mould. In the flat-fishes, as the sole, turbot, brill, halibut, flounder, and skates, there is little difficulty. By inserting the edge of a knife between the mould and the cast, the former will come off. Most fishes are laid on their sides when the mould is being made, as, for instance, perch, bream, roach, pike, cod, mackerel, salmon, &c.; but such triangular-bodied fish as the gurnard, cottus, &c., had best be placed with the belly side downwards, and their large pectoral fins spread out. Sometimes it will be necessary to break off the mould in pieces, and much care and patience will then be required. But experience in manipulation comes after a few trials, and it is astonishing how soon we learn to proceed under all circumstances.

the cast, and then covering it with a mixture of gum-water and plaster of Paris, laid on with a small camel-hair brush. The loose, leg-like rays of the pectoral fins of the Gurnard may easily be imitated in a similar way. We always like to see the dorsal, caudal, pectoral, and other fins laid out, so that the

cast shows them as when the fish is swimming (see fig. 81).

By means of a knife it will be easy to undercut the back of the expanded fins, or to loosen and cause to stand out any part of the cast that may require it. The entire cast of plaster, say to take the case of a five-pound Codfish or Salmon, will not cost more than sixpence. What is to be noted is, that fish are as fit for the table, after having had their likenesses taken as they were before !

And now comes the colouring of the cast—a more difficult, because a more artistic operation, but not half so difficult as would be at first supposed. Although the natural colours of our native fishes are given in such works as those of Yarrell, yet it is best for the student to note the distribution and tone of the colours before he commences to take a mould of his fish. This he can readily do by drawing a rough pencil outline of the fish, and then marking on it the colour, and what depth and tone. We have found these outline sketches quite enough, with the help of Yarrell and a good memory, to colour a cast twelve months after making it. Moreover, it forces the student to be particular and careful, and he is the gainer therefrom. The colours of fishes are apt to be taken from their appearance on fish-stalls. No mistake could be greater. If we are obliged to eat fishes, there is no reason why we should libel them as well ! The black-leaded tints and shades of a herring which has been lying a couple of days on a stall, are quite different from the prismatic colours it had when first taken out of the water. We prefer colouring them according to nature, rather than after the dictation of the fishmonger ; and as the colours are brighter, the effect is more artistic.

The proper colours of the eyes, fins, &c., should be first attended to. We always use water-colours, and prefer them to oils. The water-colours should be mixed with a little ox-gall to make them flow better. A wetted flannel by one's side enables us at once to rub out an error. Sufficient colour to spread over the fish must be mixed at first, and a bushy camel-hair pencil employed to distribute the colour. Such spots as those on the Homelyn Ray are easily made by rubbing the ground colour lighter, and then surrounding each spot with a ring of darker pigment. You lay on the colours and shades of the back of the fish in successive tones, until you get them deep enough. If possible have a fresh fish before you when colouring the cast, so as to get the tints, shades, spots, and other markings quite correctly. Notice the difference (often the only external means of identifying them) between the colours of the male and female fishes, as in the Mackerel for instance. The delicate prismatic tints of the silvery-white belly are the most difficult to imitate ; and the student gives up in despair the attempt to reproduce the more than silvery glint of the lower parts of the body. Still, a few endeavours to rub in alternately streaks

of lake, blue, and yellow succeed in forming a not bad imitation. We have found that a few drops of common writing-ink, diffused in a quantity of water, enabled us to reproduce the silvery and steely glint of the belly better than anything else. The student should always have plenty of the fragments of the broken mould by him, to try his colours upon before transferring them to his cast.

At last the cast is coloured satisfactorily. It must now be laid by for a day or two, until the water from the colours has been given out. Then it should be sized with a thickish solution of the best and clearest glue, and put away again for some time. At length it is brought out for the last time, and painted with a thickish coat of transparent copal or coach-varnish. This gives to the coloured cast a wonderfully moist and fish-like look, and no mould or other fungus ever attacks this varnish, as it does glue. The background may now be painted a deep Wedgwood blue, so as to represent water, and at the same time throw forth the coloured fish into strong and prominent relief.

If the coloured cast is intended to ornament a room, the background must be set in a wooden framework, with glass sides, top, bottom, and front (as in ordinary stuffed-animal cases) : these protect the specimens from dust, and the operator may thus adorn his hall or study with exact and artistic models. It will have been seen that there is nothing whatever, either of dirt or labour, to prevent ladies from engaging in what we guarantee will prove to them a most pleasant and profitable recreation.

For such small fishes as sprats, minnows, whitebait, &c., it will be advisable to make the moulds of the same materials as those composing printers' rollers ; that is, half in weight of common glue and common treacle. These are boiled together until a uniform liquid is produced, which may then be kept fluid by placing the pot containing it in a pan of boiling water, just as carpenters keep their glue-kettles. This hot mixture is then poured over such a picturesque little heap of whitebait or sprats as would make, say, a decent handful. Of course it takes the impression of the mass, and of every individual fish it covers. The mould is then to be turned the other side up, and the fishes carefully picked out one by one. At length the last is picked out, and a perfect mould of the heap remains. This must be cast in plaster of Paris, where no difficulty remains in undercutting (as would be if the mould had been made of plaster), for the soft gelatinous mould can be picked out with a penknife, and the small fishes thus form a loose, pretty heap. They must then be coloured when ready, and the background tinted blue, as above suggested.

For casting large fish more than one pair of hands may be required, as the plaster soon sets when mixed. Only two qualities are required to be successful in fish-casting, — patience and perseverance. If those who attempt to carry out the experiment possess them, they will succeed ; if they have them not, they may,

but we will not answer for it. It would be possible, we should imagine, for students to take several moulds of a rare fish, and to exchange these with one another, so as to get together a good collection of British fishes.

A WET METHOD OF PREPARING OBJECTS FOR MICROSCOPICAL MOUNTING.

IN the preparation of objects for permanent mounting, the *bête noir* of the microscopist is the too well-known and ever-recurring air-bubble. Books on microscopy seem to recommend but one way of mounting vegetable or animal tissues in the usual preservatives, Canada balsam or dammar. And this method is certainly, on the face of it, rather a peculiar one. It is that of drying the object and then steeping it for some time in turpentine. In fact, in order to get rid of the small quantity of air contained in some of the vessels, the whole of the object is filled with air, and then this extra quantity of air (unnecessarily put in) has to be quietly soaked out again, or is forcibly dragged out by the air-pump. This process of filling up with air and then extracting it again occupies no small amount of time, but, in some cases, no such expenditure of misapplied patience, even combined with the persuasions of the air-pump, will entirely extract the air.

Now, objects such as insects, sections of plants and animals, may be prepared for mounting entirely by a wet process, and that with speed and certainty.

This wet method I have used for several years, and I believed at one time that most of those interested in microscopical work must have known of it. But of late, conversation with microscopical friends has led me to imagine that it is little, if at all, known to the mass of workers with the microscope. I cannot suppose that the plan is original, though I have not yet met with any one else that has worked at it.

The only piece of apparatus required is a single test-tube. Into this the sections or parts of plants or animals are placed, and the tube about half-filled with distilled water that has been made acid with a few drops of nitric acid. The liquid is now heated almost to the boiling point for from five to fifteen minutes. The acidulated water is then poured off, and the tube filled with hot distilled water and gently shaken once or twice. The water is now completely poured off and replaced by methylated spirit; this is heated almost to its boiling point for about five minutes. It is then poured off, and the tube about a quarter filled with ether, and the contents heated gently by immersing the end of the tube in a cup of hot water for half a minute. Ether, being highly inflammable, should not be heated by, nor brought near to, a light. Now pour off the ether and quickly drop

in a quantity of turpentine that will a little more than cover the objects. The whole operation is now finished, and every particle of air and water originally in the object has been replaced by turpentine. The objects are now ready for mounting in Canada balsam or dammar.

There need be no waste of materials, since the methylated spirit and the ether may each be poured into separate residue bottles, and, after a quantity has been collected, be re-distilled without any loss worth mentioning.

In this method we first fill the object with its natural permeator, water, and then replace this with methylated spirit. This latter, being of greater tenuity, enters into some of the minuter vessels which the water has still left only filled with air.

Ether is next made to take the place of the spirit, and this, from its marvellous tenuity, rapidly fills any vessels that the spirit even had perchance failed to fill. Thus a road, as it were, having been made for fluids, turpentine easily and rapidly spreads throughout the object. I know that there is a process somewhat similar in which oil of cloves is used. But oil of cloves has not the same extreme tenuity as ether, and so does not permeate tissues anything like so thoroughly as ether does. It is also rather expensive, and does not readily admit of being used over and over again.

The advantages of the wet process are its economy of materials, its leaving the object almost unaltered in appearance, its cleanliness, and, above all, its extreme rapidity and certainty.

Only a single test-tube is required in which a dozen or two of objects may be placed at one time.

The re-agents, with the exception of the water and acid, which are not worth saving, may be used again and again.

In drying an object, since all the water which made up so much of its bulk is driven off, its shape is often greatly altered, its original form being only partially restored by the after processes. By the wet method, the cells are never empty of liquid; of course, both spirits and ether shrink objects to some extent, but the turpentine and balsam usually all but entirely restore the original form. As to the time taken, the drying method often requires weeks; the wet method seldom needs an hour. There are some objects which I have never seen entirely freed from air by the drying process, followed by prolonged soaking in turpentine and the use of the air-pump; but I have not yet seen an object that the wet process would not rapidly free from air. It is possible by this method to cut three or four fresh sections from a tree, permanently mount them in Canada balsam or dammar without a single bubble of air, ring them with coloured cement, and label them within the hour.

The use of nitric acid is not a necessity, but it quickens the process. Sometimes it is better to use in its stead a little potash, only then the objects

should be afterwards well washed with distilled water before adding spirit. Objects, such as some parts of insects, which are not transparent, need, as usual previous maceration in potash solution. Benzole would, doubtless, do equally well as ether, but I have hitherto only used the latter.

This method is not applicable to all objects; those containing, like the water-lily, an excessive amount of water shrink too much, and must be mounted in fluids. If it be desired to stain the specimens, this is best done by adding the dye to the methylated spirit.

I do not claim this as a new method, but, as I know many workers who have not heard of it, I thought that such might care to try so expeditious, easy, and certain a method. A. W. STOKES.

Laboratory, Guy's Hospital, S.E.

MICROSCOPY.

A NEW IMMERSION OBJECT-GLASS.—At the last Meeting of the Royal Microscopical Society, Mr. J. H. Stephenson read a paper on this subject, in which he described a new immersion object-glass which he had designed to obviate the difficulty often experienced in the accurate arrangement of the adjusting collars of high-angled objectives. This glass had a focal distance of 1.9, and a balsam angle of 113°. It was stated to bear very deep eye-pieces, and to have a very flat field. The great difficulty of obtaining an "immersion" fluid having the same refracting index as crown glass has at length been overcome by the adoption of oil of cedar-wood, diluted with 1.5 parts of oil of fennel-seed.

MARINE AMŒBA.—Dr. Entz states that species of *Amœba* have been found in sea as well as fresh water. At Cuxhaven he found two species, *A. limax* and *A. radiosa*, very abundantly. He regards *A. marina* as probably identical with *A. radiosa*, and possibly also Haeckel's *Protamœba polypodia*.

"A NEW FIELD FOR THE MICROSCOPE."—Under this title, Mr. W. Saville Kent, F.L.S., has a profusely illustrated article in the April number of the *Popular Science Review*. It describes the life-history of a new group of flagellate monads, which require a very high power to determine; and the writer very properly remarks that the new and high class magnifying powers, often only used to resolve dots or striæ on a diatom, or to solve a question of angular aperture, might very usefully be employed in following out the details of the life-histories of these most interesting organisms. The article is of a most interesting character throughout.

Fossil DIATOMACEÆ, &c.—Some months ago I received a piece of cement-stone from the island of Fûr, coast of Denmark. It is a poor variety of limestone, and if a portion be dissolved in acid, the residue,

when examined, is seen to consist of interesting marine forms of diatomacœ, chiefly species of *Triceratium*, I believe, possibly *Amphitetras*, also a few *Coscinodisci*, and a great many small *Polycystina*, and *Actiniscœ*. Is this stone generally known to microscopists?

I have not been able to get any information concerning it. Dr. Carpenter mentions *Triceratium* occurring in a fossil state only in the Bermuda and Richmond earth.—*Will. Paterson.*

DIATOMACEOUS DEPOSITS NEAR RICHMOND.—I send herewith specimens of prepared diatoms, from parts of the Richmond and Petersburg fields, lately discovered by me. The Petersburg slide shows several varieties of *Coscinodiscus*, *Actinocyclus*, *Actinoptylchus*, *Pleurosigma*, and *Euphrodiscus*. There are many specimens of *Triceratium* on it, the most characteristic being perhaps *T. spinosum*; *B. rhombus* is also plentiful. The transparent character of most of these diatoms, and the fact of finding many forms in this deposit, common in fresh water, would indicate that this part of our diatomaceous stratum may have been laid down near the mouth of some great river of later tertiary times. The Richmond slide shows most of the rare forms of that deposit in greater abundance than I have ever seen before, while it contains comparatively few of the *Orthosira marina*, which makes the larger portion of the deposit from other parts of the Richmond field. A *Navicula* with curious beading on the connecting zone, and very fine striation, is shown in tolerable abundance, from four to six or more on each slide. This particular form, Prof. H. L. Smith thinks new, and it is a very good test for a 1.8th or 1.10th objective, which should resolve it into squares with oblique light. The areolations on the larger *Coscinodisci* can be seen with a good simple triplet, while to show the markings on some of the *Rhizosolenia* is a test for the very best high powers. The two Richmond *Pleurosigmas* *Virginica* and *angulatum*, are also plentiful, and as the striation on these is uniform, so far as my observation goes, this slide makes one of the best general tests to be had, furnishing an accurate measure for the comparison of objectives, of nature's own ruling, perhaps superior to any artificial lines made.—*C. L. Petricolas, Richd., Va.*

LIVING MICROSCOPIC ORGANISMS.—It is with great pleasure that we draw the attention of our microscopical readers to the agency started by Mr. Thomas Bolton, whose advertisement has several times appeared in our columns. For a trifling sum, Mr. Bolton sends forth living organisms of *Spongilla*, *Hydra*, *Actino-spherium*, &c. It is some time since we had more sincere pleasure in recommending what our microscopical readers will agree with us in affirming is a genuine and praiseworthy undertaking.

AN APOLOGY FOR DIATOMANIACS.—Professor J. E. Smith, in an address delivered before the

Dunkirk U.S. Microscopical Society (published in the *American Journal of Microscopy* for March), makes the following remarks:—"We often hear the diatomists spoken of in terms of contempt. They are now regarded by the histologist as a class of observers who use the microscope as a mere plaything, and the fact that diatomists are not altogether agreed as to the structure of these favourite shells is often used as an argument to show the folly of studying diatomaceæ at all. All this, my friends, is sheer sophistry. The study of the diatomaceæ is as legitimate as that of any other branch of the science of Biology, and the labours of the diatomists have not been for nought: it is to them, and to their constant demands on the optician, that we are indebted for the wonderful improvements which have been made in object-glasses; and I am bold enough to tell you that skilful diatomists can tell you as much about the structure of a diatom as can the pathologist equally skilled inform you as to the structure of a blood-corpuscle. But to the student, to those who desire to *prepare* themselves for advanced work, the study of the diatomaceæ cannot be neglected. No line of practice has yet been discovered that will teach the student the use and management of his tools that can at all compete with the superior claims of these minute organisms. It is said that 'adversity tries us, and shows up our best qualities.' The little shells, too, will try the would-be manipulator, and, like the country judge, show up his worst qualities."

ZOOLOGY.

THE LITERARY AND PHILOSOPHICAL SOCIETY OF LIVERPOOL.—The "Proceedings" of this well-known society always contain welcome matter. The thirty-first volume is now to hand, containing a masterly address by Mr. A. J. Mott on Haeckel's "History of Creation," in which the writer opposes the evolutionistic view. Mr. J. A. Picton, a well-known antiquary, and president, publishes his presidential address on "The Present State of Linguistic Science"; Mr. Edward Davies has an essay concerning "Popular Errors about Poisons"; Mr. George Morton one on "The Introduction of Geological Maps"; Mr. Alfred Morgan another on "The Origin and Progress of the United States Geological and Geographical Survey of the Territories"; the Rev. H. H. Higgins one on "The Liverpool Museum Reports," &c. Besides the above there are numerous papers on purely scholastic and literary matters. A handsome and bulky volume is thus compiled.

NATURAL HISTORY SOCIETIES.—We have received the eighth annual report of the Wellington College Natural History Society, and are pleased to find indications of increased vigour on the part of the members. It is an excellent thing to find natural science culti-

vated for its own sake by the students of our public schools, and still more so to find, as this and other reports give evidence of, that the students are doing actual field work, and thus contributing to the solid stores of scientific information. The present report shows that in addition to various papers read and excursions made, the botany and ornithology, &c., of the district has been worked, collections and observations made, and lists published of the results. We wish the Society continued success in its ardent and praiseworthy labours. The Huddersfield Naturalists' Society, established in 1847, for the promotion of knowledge in various branches of Natural History, have issued their list of members, &c.; each member has the special study to which he is attached placed after his name. Curators are appointed for the departments of conchology, botany, entomology, zoology. The report of the Chichester and West Sussex Natural History and Microscopical Society, just issued, shows that the Society is in a healthy condition. At no previous period has the number of working members been so great as at present. Eighteen papers on various natural-history subjects were read during the session just terminated.

TOAD AND GOLDFISH.—The incident which Mr. Horace Pearse relates (p. 94) of his Goldfish being so tenaciously embraced by a toad, is easily explained by a knowledge of the habits of toads and frogs. At this season of the year, or a little earlier, when their generative instinct is intensely strong, the male clasps the body of the female with his fore-legs in order to fecundate the ova as they are emitted. To enable him to do this the more firmly, a small digit or warty protuberance is temporarily developed in the thumbs, and the hold is thus rendered so secure that it requires considerable force to effect a separation. It was in obedience to this strong instinctive impulse that the toad in question grasped the goldfish "firmly by the head in his front legs." That male frogs should attach themselves to the surface even of large fishes is not an unfrequent occurrence, and old Izaak Walton referring to a fact of this kind, attributes it (erroneously of course) to a "great antipathy betwixt the pike and some frogs."—*Ed. Hart Vinen, M.D.*

THE "HARVESTMEN."—Mr. J. H. Cary, in his interesting observations on the Harvestmen or Phalangiidæ, desires to have further information on the subject. The monograph on the British species by Mr. R. H. Meade, F.R.C.S., in the *Annals and Magazine of Natural History* for June, 1855, is excellent, and I think the only one in the English language. For the anatomy of *Phalangium Opilio* there is a paper by Mr. A. Tulk in the same magazine for October, 1843. Mr. Cary has fallen into some errors regarding the true spiders. He seems to imply that the palpi are the reproductive organs of the male spider; which is hardly the fact, for the male has a complete generative system in the abdomen, and the

palpi are only conveyers of the seminal fluid. Also, he says, there are spiders without spinnerets, which is very doubtful: there is but one species, *Liphistius desultor* (Schrötte), found at Penang, of which the typical specimen had no spinners; but the Rev. O. P. Cambridge, M.A., has since described a specimen in the British Museum, which is in all respects *L. desultor* except having the spinners. The "Harvestmen" that Mr. Cary describes, are, I think, from his description of the falces, *Phalangium cornutum* (Linn.). He has probably mistaken the stigmata on the fore part of the cephalothorax (as Mr. Tulk did) for another pair of eyes, as our British species have but two, placed on the apex of the cephalothorax. The male and female of *P. cornutum* are often mistaken for different species, because of the great difference between the falces. Regarding the moulting of the Phalangidae, I have never heard that they cast their skin as spiders do, but maybe Mr. Cary has made some observations that would prove that that is the case. The abdomen of true spiders is not segmented as in the Phalangidae.—*Tom Workman, Belfast.*

PRACTICAL DARWINISM.—Dr. E. Coues, of the United States Geographical Survey, states that a breed of *solid-hoofed* pigs has apparently been established in Texas. The terminal phalanges of the toes are united to form a single broad phalanx. Above this, however, the other two phalanges of each of the two principal digits remain perfectly distinct. The hoof is perfectly solid, and on its sole there is a broad angular elevation of horny substance, very like the "frog" of the horse's hoof. The breed is so firmly established that no tendency to revert to the original form is noticeable. It is also stated that in the cross of a solid-hoofed boar with a sow of the ordinary type, a majority of the litter have the peculiarity of the male as regards their feet.

THE COLOURS OF CATERPILLARS.—At a recent meeting of the Entomological Society of London, Sir John Lubbock, in accepting the opinion laid down by Darwin, that dull-coloured, green, and smooth-skinned caterpillars are eaten by birds, whilst spiny, hairy, and brightly-coloured species are rejected, stated, that by the statistical method it was proved that no hairy caterpillars are ever green; whilst, on the other hand, a large majority of black and brightly coloured species are hairy or otherwise protected.

THE CERATODUS.—Mr. E. P. Ramsay has recently written to *Nature*, to say that a fine series of eleven *Ceratodus* have been kept alive at Maryborough, Queensland. This rare and geologically ancient fish can only be obtained at certain seasons, and in certain parts of the rivers Mary and Burnett. The *Osteoglossum* is frequently and erroneously confounded with it.

BOTANY.

THE LONDON FLORA.—The doubts as to the actual occurrence near London of *Crepis paludosa*, expressed by the author of a review on the new London Flora, in the *Journal of Botany*, are well founded. It is not that species, but *Crepis setosa*, which occurs in the locality indicated. The entry in my note-book with regard to it was corrected in one place and not in the other; hence the mistake. *Carex curta*, hedge at Totteridge, is right in the Index; while the entry in the Localities should have been *Carex divulsa* (lane), *curta* (hedge, &c.). Both species are not unfrequent in hollow lanes both of Middlesex and Herts. *Bromus racemosus*: the habitat, &c., given of this plant refers to *B. giganteus*. The entry should have been "meadows and pastures: flats by the Thames in Kent." Many English authorities consider this species a variety of *commutatus*; smoother and with panicles more compact. But the distinguishing characteristics ascribed to them by the French botanists are, outer glumellas entire, *B. pratensis* (i.e. *commutatus*), outer glumellas notched (*échanchées*), *B. racemosus*. Through inadvertence, interlineations in the MSS., and inexperience in the correction of proofs of the kind in question, errors and misprints were extremely probable, and "these are of them." Others, the omission of "*Bromus mollis*, common, everywhere," for example, I leave to the critics to find out and dilate upon, wishing them every gratification in the task.—*Eyre de Crespigny, M.D. P.S.*—*Nasturtium sylvestris* in the Index should have been *N. terrestre*, and *vice versa*, as may be guessed from the context.

RAPID GROWTH OF VALLISNERIA.—Mr. A. W. Bennett says: "The first flower-bud of *Vallisneria spiralis* made its appearance in my aquarium last year on July 1st, the pedicel being at three p.m. about 1.5 inch long. On the 3rd, at four p.m., the base of the bud just touched the surface of the water, and the pedicel was about 7 inches long. At one p.m., on the 7th (an interval of about ninety-three hours), it had reached the astonishing length of 43 inches."

EARLY FLOWERING OF BORAGE.—It may be interesting to your readers to know that the common Borage (*Borrago officinalis*) is in full flower as early in the year as this. I do not know of any instance of this plant being seen so early in flower, *June* being usually its earliest time for appearing. The specimens in question were gathered by my brother, Mr. F. H. Worsley Benison, of Chepstow, at Beechley, near that town, on March 27th, and sent to me. It was found in abundance on a bank immediately overhanging the Severn.—*H. W. S. Worsley Benison.*

THE FERNS OF NORTH AMERICA.—Messrs. Hardwicke & Bogue announce their intention to issue in parts (by arrangement with the American publishers), Professor Eaton's "Ferns of North America."

"FLOWERS: THEIR ORIGIN, SHAPES, PERFUMES, AND COLOURS." By J. E. Taylor, F.L.S., &c. London: Hardwicke & Bogue.—The position we hold in relation to this book prevents our doing otherwise than drawing attention to its publication, although this opportunity affords us the means of thanking both Printer and Publisher alike for turning out so handsome and attractive a volume. The arrangement of the contents is as follows:—Chapter 1, "The Old and the New Philosophy of Flowers;" 2, "The Geological Antiquity of Flowers and Insects;" 3, "The Geographical Distribution of Flowers;" 4, Ditto (*continued*); 5, "The Structure of Flowering Plants;" 6, "Relations between Flowers and their Physical Surroundings;" 7, "Relations between Flowers and the Wind;" 8, "The Colours of Flowers;" 9, "The External Shapes of Flowers;" 10, "The Internal Shapes of Flowers;" 11, "The Perfumes of Flowers;" 12, "Social Flowers;" 13, "Birds and Flowers;" 14, "The Natural Defences of Flowering Plants." The work is embellished with thirty-two coloured figures, and nearly one hundred and fifty woodcuts.

BOTANICAL CURIOSITIES.—Most of these facts were communicated by me to the *Natural History Journal* (W. Sessions, York), a monthly magazine, intended to encourage young people in the prosecution of scientific pleasures. By one path in one field at Woodhouse, near Sheffield, three forms of *Plantago major* have been gathered:—(1) spike bifid; (2) the very small bracts developed into little foliage-leaves, over an inch long below, and lessening towards the top, so as to form an elongated cone, in which the flowers themselves were still present; (3) flowers on branches from the main stem, *i.e.*, in a *raceme* instead of a *spike*. The last form, being very handsome, we have tried to keep in our garden; vainly, however, for it bears no seed, and after two or three years, it dies. Near Sheffield, also, we picked two specimens of *Scabiosa arvensis*; one with its involucre bracts so large as to extend far out from under the head of florets; the other, long since transplanted into our gardens, where it receives the admiration of all its beholders, with globe-shaped heads of flowers, the peculiar outer ones being absent. In Sherwood Forest, between Edwinstowe and Mansfield Woodhouse, in a sandy lane, in company with *Plantago coronopus*, was a fasciated specimen of *Crepis virens*, several stalks appearing as a single flat one, $1\frac{1}{10}$ inch broad all the way up, and clustered at its summit with flowers. By Wharncliffe Crags, in the Don Valley, a birch, 9 inches at least in diameter, appears at a height of about 12 feet, from out the trunk of an old oak. In a valley through which runs a stream, dividing Yorkshire from Derbyshire, a little tributary of the Rother, once crystal-clear and trout inhabited, now anon black from "sleck washing," and again ochre-yellow from the pumpings out of a colliery, we gathered a dandelion with leaves 2 feet

long, and proportionately broad; also another with twin heads on one scape. In a valley by Coal-Aston, near Dronfield, *Orchis maculata* appeared in various shades of hue till nearly pure white. White Columbine occurred in Hell Wood—a splendid locality by Roche Abbey, near Rotherham. White Hair-bells (*Campyula rotundifolia*) occurred in Monsall Dale, near Bake-well. My experience is identical with that of a recent writer in SCIENCE-GOSSIP, in the process of drying, White Hair-bells turn blue; Blue Hair-bells, white. Linnæus named the Red and White Campions, *Lychnis diurna* and *L. vespertina*, as one species—*L. dioica*. In Cliff Wheel Wood (Rother Valley), a bed of Red Campion contained several with *white blossoms*; nor is it rare to see White Campion, in fields or waysides, assuming a rosy tint. In Hail-Mary Hill Wood (named, as some suppose, from signalling made to the unfortunate "Queen of Scots," then imprisoned in the Earl of Shrewsbury's Sheffield Manor, which is visible from the wood) we collected a *Lychnis diurna*, with leaves all triple-pointed. Near York, we saw all these with white blooms:—*Trifolium pratense*, *Geranium pusillum*, *Scabiosa succisa*, *Calluna vulgaris*, *Erica tetralix*. In the extreme north of Derbyshire, *Raphanus raphanistrum*, the Wild Radish, was both white and brimstone-yellow. On September 20, at Castle Howard, near Malton, a Dog-Violet (*Viola sylvatica*?), had three unjoined carpels, holding seed, and accompanied by a few small calyciform bracts; Water-ress (*Nasturtium officinale*) was also in flower, and a tangled mass of it rose 5 feet, at least, out of the water. *Rumex alpinus* is a species, doubtfully indigenous; it still grows by One-ash Farm, near Monyash, N. Derbyshire; but this homestead, long tenanted by the Quaker family of Bowmans, was once a place of exile and "durance vile" for the refractory brethren of a Yorkshire Abbey; it is well-known that monks esteemed it virtuous as a healer, and grew it in their herb-gardens. My friend, Alfred Montague Grimsley, of Leicester, found bifid and trifid catkins of *Salix fragilis* by the river Foss, near York. My brother, F. T. Le Tall, observed albeds of *Orchis pyramidalis* and *Centaurea nigra*, near Scarborough; he also plucked a Rose (*Rosa villosa*?), *fully double*, many yards from any house, some miles from any village, in one of the deep, narrow, well-wooded, and well-watered gullies lying amid the moorland which extends from Levisham, near Pickering, to Scarborough.—B. B. Le Tall, York.

"THE HISTORY OF BIBLE PLANTS."—Under this title, Messrs. Hardwicke & Bogue have just published an attractive little book, written by Mr. J. Smith, A.L.S., of Kew, the well-known botanist. It is abundantly illustrated with lithographic plates by Mr. W. H. Fitch, F.L.S., perhaps the best botanical draughtsman of the day. Mr. Smith's name as author is enough to ensure fulness and correctness of detail.

Perhaps we have never before had so trustworthy—certainly we have never had one so cheap and well got up—a book on Bible Plants. It will make an excellent gift-book for young and old alike.

REPORT OF SCIENCE-GOSSIP BOTANICAL EXCHANGE CLUB.—Your remark (p. 74) on my note regarding *Callitriche autumnalis*—that it will very probably be found in the Till and the lower reaches of the Tweed—in which you say, “We believed this was recorded by Dr. Johnston several years since,” is founded on a mistake in the “Flora of Berwick-upon-Tweed” (1829). *C. autumnalis* is there recorded from “Pools of Water in the Vale below Langleyford” (Fl. Ber., i. p. 3). In the “Botany of the Eastern Borders” (1853), by the same author, *C. autumnalis* is left out, which shows that Dr. Johnston had discovered the mistake, although he makes no remark concerning its record in his earlier work, or what species was there mistaken for it. From seeing a specimen of *C. pedunculata*, which was gathered in the above locality, and labelled by Dr. Johnston *C. autumnalis*, and also its frequency in the district, I have no doubt that it was that variety. I enclose an example of a similar form of *C. hamulata*, with all the leaves linear, which is apt to be mistaken, when not in fruit, for *C. autumnalis*, by those unacquainted with that species; but when once known, they are easily distinguished.—A. B., Kelso.

GEOLOGY.

THE FOSSIL FUNGUS.—In answer to that part of W. G. Smith's letter on p. 67 of March number, referring to mine on p. 41 of February number, he states that “such a genus as *Peronosporites* was not known till last year,” and yet he tells us just previously that it had been known to Mr. Carruthers for many years; and Mr. Carruthers stated in a late presidential address delivered in London, that he only knew of the existence of two Palaeozoic fungi, one of which he had himself described. My friend Mr. Young being present, at once rose and said that he had a very fine section, showing fungoid growth, in his own cabinet. This is the section that Mr. Smith has in his possession now, and it is the same section that I cut from a specimen of *Lepidodendron* I found on my first visit to Halifax in 1869. The fungus Mr. Carruthers alluded to in his address above mentioned, was found in an Eocene fern-stem from Herne Bay, and is described as probably belonging to the genus *Peronospora*. The Manchester gentleman alluded to by Mr. Smith instantly recognized my fungus as *Peronospora* in a fossil state, but it required more learning to give it the name of *Peronosporites*, a distinction without a difference. If Mr. Carruthers is the discoverer of this fungus (as Mr. Smith says he is), how comes it that my friend Mr. Young should write

to me as soon as Mr. Smith's paper appeared, and say that my name was to have been mentioned in connection with the discovery, but by some mistake it had been “forgotten”? Mr. Smith tells us what drudgery he has been put to while labouring to find a new name for this fungus, I may tell him that I have also been a “slave” to the study of fossil botany for very nearly twenty years, and that I have pored over my sections too many hours to let either fungus, or any other, new or old, object escape my notice.—JOHN BUTTERWORTH, *Goats Shaw, Oldham*.

GOVERNMENT RESEARCH FUND.—Among the names of those who have received grants from the Government fund of £4,000 recommended by the Royal Society, we find the names of the following:—Prof. H. A. Nicholson and R. Etheridge, jun., “For aid in examining the fauna of the Silurian deposits of the Girvan district, Ayrshire, and in publishing a descriptive list of the same,” £73; Mr. C. Callaway, Wellington, Shropshire, “For aid in working out the so-called Eruptive Rocks of Shropshire, and in verifying certain points in local geology,” £25; to Dr. J. W. Dawson, Montreal, “For aid in excavating erect trees in the Coral Formation of Nova Scotia, in beds where they are known to contain reptilian and other remains,” £50; to Dr. R. A. Traquair, Edinburgh, “For aid in preparing and publishing a monograph on the Carboniferous ganoid fishes of Great Britain,” £75; to Dr. Henry Woodward, “For continuation of work on the Fossil Crustacea, especially with reference to the trilobites and other extinct forms, and their publication in the volumes of the Palaeontographical Society,” £75; to Prof. H. G. Seeley, “For an examination of the structure, affinities, and classification of the Extinct Reptilia and allied forms,” £75; to Rev. J. F. Blake, “For aid in continuing the publication of a Synopsis of British fossil Cephalopoda,” £100. Besides the above, we find the names of W. Saville Kent, Jersey, “To pay for microscopical apparatus for the further prosecution of investigations into the structure and life-history of certain lower Protozoa,” £50; to R. McLachlan, “For aid towards the publication of a revision and synopsis of European *Trichoptera*,” £50; to Prof. A. H. Garrod, “For aid towards publication of the second fasciculus of an exhaustive Treatise on the Anatomy of Birds,” £100; to Prof. W. K. Parker, “For assistance in continuation of researches on the Morphology of the Vertebrate Skeleton; and the relations of the Nerves to the skeleton structures, chiefly in the head,” £300.

FOSSIL WALRUSES.—The Ipswich Museum now contains a splendid series of tusks of the fossil walrus (*Trichecodon Huxleyi*) found in the Red Crag. These were recently sent up to the Linnean Society by J. E. Taylor, and described by Prof. Ray Lankester. It was discovered that the two supposed species were in reality tusks of male and female animals.

THE TRIASSIC STRATA OF THE SOUTH-WESTERN COUNTIES.—At a recent meeting of the Geological Society of London, a paper was read by Mr. W. A. E. Ussher, F.G.S. The author maintained that the general thinning-out of the Trias in the South-Devon and West-Somerset area as it is traced northward, of which he adduced evidence, proves that this area was not connected with that of Gloucestershire and the Midland counties until the later stages of the Keuper; and endeavoured to show by a comparison of sections that the area east of Taunton and south of the Mendips was not submerged before the deposition of the Lower Keuper Sandstone, and probably not until the later stages of its formation, the Quantocks acting as a barrier dividing the Bridgewater area from the Watchet valley. He thought that a subsidence progressing from south to north led to earlier deposition in South Devon, and to a consequent attenuation of the lower beds towards Watchet and Porlock. Hence the lowermost beds of the Trias of the south coast are much thicker than their more northerly equivalents, and probably were still thicker where the English Channel now flows, some beds perhaps dating as far back as Permian times. The presence of numerous fragments of igneous rocks (quartz-porphyrries) in the basement-beds of the South Devon Trias, and the absence of known corresponding rocks in the county, led the author to infer that the cliffs and beds of the early Triassic sea were composed of such rocks, any undestroyed portions of which would probably occur either under the Triassic beds near Dartmoor and between Newton and Seaton, or in the area now occupied by the English Channel. As continuity is evident only in the upper division of the Trias, between the area of Devon and Somerset and that of the Midland counties, and there is no conformity in the former, the author maintained that the upper marls, upper sandstones, and probably the conglomerate and pebble-bed subdivision of Devon and Somerset, are equivalent in time to the Keuper series of the Midland counties, and that deposition took place in Devon and Somerset between Keuper and Bunter times, bridging over the hiatus marked by unconformity in the Midland counties.

THE NEWLY-DISCOVERED DINOSAURS.—Prof. Marsh has named the new family of gigantic fossils Saurians, recently discovered in the Oolitic rocks of America, *Atlanto-sauridæ*. One species (*A. immanis*) had a femur over eight feet long, and, taking a crocodile as a comparison, Prof. Marsh thinks that *A. immanis* may have been more than one hundred feet in length!

AN AMERICAN FOSSIL CERATODUS.—Prof. Marsh has recently described the dental plate of a fossil fish belonging to the curious existing Australian genus *Ceratodus*, under the name of *C. Güntheri*. It was found in the upper Oolitic deposits of Colorado, and

is the first specimen of *Ceratodus* which has been found in America.

FOSSIL INSECTS.—At a recent meeting of the Entomological Society of London, Mr. H. Goss exhibited a collection of fossil insects from the Leafcuds at Bournemouth. They had been obtained by M. J. S. Gardner, F.G.S. Among them were numerous *Coleoptera* and *Hymenoptera*, including a finely-preserved anterior wing of *Æschua*.

ARTIFICIAL ALBITE AND ORTHOSE.—In addition to the artificial Corundum, Ruby, &c., which have been made by Messrs. Frey & Feil, M. Hautefeuille now announces similar artificial reproductions of *Albite* and *Orthose*, which have both been discovered in the copper furnaces, both at Mansfeld and in the Hartz. It is supposed they have been formed by sublimation, with the aid of the calcium chloride employed as flux.

THE GEOLOGY OF IRELAND.—A want long felt by all students of Irish geology has been a good textbook. We understand that before the meeting of the British Association in Dublin in August next, a "Manual of Irish Geology," by Mr. G. H. Kinahan, will be published. With the exception perhaps of Sir Richard Griffith, there is no one more competent to write such a book than Mr. Kinahan. The work will have a description of the sedimentary rocks, and also of the igneous, or, as the author calls them, "Eruptive" rocks, chronologically arranged, together with short descriptions of the superficial deposits, minerals, mines, soils, and prehistoric remains, including the Crannoges, Kitchen-middens, &c.

NOTES AND QUERIES.

BIRDS' EGGS.—"L. W. G." (p. 43) is mistaken in stating that an Act of Parliament has been passed to prohibit the taking of birds' eggs. The taking of the birds only, during the close time, is prohibited by the "Sea-birds' Preservation Act," 1869; the "Wild-birds' Protection Act," 1872; and the "Wild-fowl Preservation Act," 1876. Therefore, no person can "break the laws of the land in this particular," except in the case of eggs protected by the Game Laws.—*R. Egerton.*

THE MARTEN (*Martes foina*).—Modern invasion of its haunts with axe and gun has rendered this a very rare animal in Cornwall. The capture of a female is thus noticed in the *Western Morning News* of March 15th:—"The marten cat, which is now almost an extinct quadruped in England, has occurred at or near Delabole within the last ten days. It was caught in a gin, and proved to be a female. It is the finest and the most elegant of all the weasel tribe, and it more frequently is observed in trees, along the branches of which it may be seen creeping or jumping after its prey, which consists of birds, squirrels, &c. Its actions are most graceful and elegant, and it is to be regretted that so beautiful a wild animal, which used to be more or less seen in our woodlands, should be extirpated and lost. There are two varieties, not now supposed to be specifically distinct, viz., the common,

or beech marten, with a white breast, and the yellow-breasted, or pine marten. It is now supposed that the yellow-breasted sort is a younger animal than those which have a white breast; at all events, specimens have been obtained from the same covert, having an intermediate tone of colour. Foxhounds hunt this animal with great eagerness, and seem to like their scent. It has been remarked that the viscid effluvia belonging to the other members of the Mustelidæ does not exist in the Marten, which has the usual glands for the secretion of humour; but, instead of a fetid smell, it emits a musky and rather agreeable odour."

WORMS IN STICKLEBACKS.—I have been waiting patiently for some answer in the pages of SCIENCE-GOSSIP to a letter of mine asking the nature and reason of the occurrence of large flat worms in every stickleback taken from a certain pond. These worms, in number as many sometimes as six, seemed almost to fill the fish, and to cause their death in our aquarium. The matter seems to me both curious and interesting, and I should be glad if some correspondent would give an account of them.—*W. E. Thompson.*

TREE-CREEPER.—Leaning against a tree in Hyde Park, London, I saw a Tree-creeper, *Certhia familiaris*, alight on a tree close to me and begin searching for insects. I watched it for some time, till it flew away to another tree, whither I followed and again watched it. Are they often seen in London?—*Arthur S. Blackett.*

THE BOTANY OF THE CHANNEL ISLANDS.—Can any of your readers give me any information as to the best method of conducting a botanical tour in the Channel Islands? Is the living there expensive or not? Is it best to put up at hotels, or at farm-houses? Any such information will be most acceptable.—*J. Comber.*

FROG-SPAWN.—I send a few notes on some frog-spawn collected on March 14th of the present year, and exposed only to the natural atmosphere. March 15th, at 7 p.m.,—a few tadpoles free from the albumen. March 20th, all out of the embryo state, and, by the 22nd, the gills clearly visible. During the cold weather at the latter end of the month, the tadpoles lay at the top of the water, apparently stupefied.—*R. E. S., Richmond.*

MIDNIGHT SONGSTERS.—In reference to the thrushes and blackbirds, together with other of our sweet songsters, singing at midnight during the early spring and summer months (SCIENCE-GOSSIP, page 93), we have often noticed this fact with surprise, especially on a fine bright night, when the chorus of song seemed to be carried on through the night, with very little cessation, increasing in liveliness as the early morning dawned, causing one to remark that the birds sang all night as well as all day long. Some four years since, about the months of May or June, many people visited our neighbourhood (Newcastle, Staffordshire), to listen to the sweet music of the various birds singing far on in the night; among which was one of the warblers, whose note was so sweet that it was mistaken for a nightingale. The latter bird has rarely been known to come so far north.—*E. Edwards.*

CUCUMBER AND BLACK BEETLES.—In reply to Mr. Smyth's question, as to whether the peel of the cucumber destroys as well as allures the beetle, I venture to remark that it does both. Some members of my own household have tried the experiment; the

smell of the cucumber peel allures the beetles, and after eating it they die almost directly, some close to the peel, others as they are moving away from it, to retire in their holes.—*E. Edwards.*

WHAT IS THE WHIPULTRE (SCIENCE-GOSSIP, No. 160, p. 95).—I do not think Chaucer's "Whipultre" has ever been satisfactorily identified, and I can only make a very diffident suggestion as to the species meant. In some dialects the cross-bar from which horses pull a plough is called a "whippetree," and these are generally, if not always, made of ash. It is possible, therefore, that the whipultre is the ash; and it might be so called because whipple-trees were made from the wood, or the instruments might be named from the tree of which they were made. This view receives confirmation—very slight, it is true—from the fact that whilst most of the more common trees are mentioned by Chaucer in the passage indicated, the ash is omitted from the list. The Corneltree (*Cornus sanguinea*) has been suggested, but I do not know on what grounds.—*Robert Holland, Norton Hall, Runcorn.*

FLUID FOR STRENGTHENING BONES, &c.—Will some of your readers inform me whether dilute silicate of potash, recommended some time back by one of your correspondents for strengthening fragile shells, is suitable for fragile small bones and teeth, say, of *Arvicola*, &c.?—*John Fuller.*

PRESERVING SKINS.—Sir, I should feel greatly obliged if any one could tell me of any means of preserving the skins of birds and other animals without the use of arsenic and corrosive sublimate, or any other poison. If you will be good enough to answer this query in the pages of SCIENCE-GOSSIP, kindly do so under the initials "J. Y."—*J. Young.*

THE COLORADO POTATO-BEETLE.—Without affecting to undervalue Mr. Rye as an antagonist, I certainly should not have asked you for any portion of your space to reply to him had he not chosen to indulge in insinuations, as I think, totally uncalled for. Notwithstanding Mr. Rye's strictures, I adhere unflinchingly to the positions taken in my first paper. 1st. That the potato-beetle is not of such great import as to justify Mr. Rye in dubbing him an "oppressor," nor in saying that "earnest and energetic steps should be taken at the present unprecedented juncture" to prevent the access of the foe to the shore of Great Britain. 2nd. That although it is well to exercise vigilance in this matter, I do condemn the use of Paris green as a curative agent, because dangerous and totally unnecessary; and I say again, without intending any reflection against anybody in particular, that the notoriety given to Paris green in America is very probably due to the cause mentioned in my first paper. As to the "fouling of the nest," then, the charge would appear to be groundless; but whether or not, I contend that this is one of the cases in which truth should prevail. Mr. Rye appears to think that I have unjustly classed him among the *alarmists*. I never so classed him, except by implication. Will any one read over the first part of Mr. Rye's article in your September number, and say whether such a classification would not have been correct? To be sure he does, in your March number, inform us that the article "was written sarkastic," and as I did not appear to see the "*sarkasm*," he impeaches my knowledge of the English language. I fear that I shall have to plead guilty; but the language used by Mr. Rye is in general anything but funny. Still he ought best to know whether or

not he was "funning," and if he insists upon it that "it is all a joke," there is an end of the matter. In conclusion, I object to Mr. Rye's dragging into this matter the names of gentlemen not even alluded to by me; thus implying that my remarks had reference to some or all of them. There is nothing in my paper justifying such implication. Mr. Rye thinks that my concluding "caution" betrays an ignorance of the British insect fauna, "remarkable in one who proposed to allay our fears," &c. &c. I confess to a respectable amount of ignorance of British insect fauna, although I have Rye's "British Beetles," and one or two other things of the kind; and why ignorance on such a point should be remarkable in a person professing some knowledge of potato-beetles, I cannot imagine. My notion was that, in case the potato-beetle did arrive, it was just possible that some of its parasites might arrive with it; and further, that striped beetles might appear in potato-fields, which, if mistaken for *D. 10-lineata*, might have their existence shortened without cause.—*W. Andrews.*

THE SONG THRUSH AND MISSEL THRUSH.—Mr. Ingleby asks if it is not an unusual occurrence to find the Missel Thrush (*Turdus viscivorus*) nesting on the top of a wall. It is certainly an unusual occurrence; but it should be borne in mind that birds frequently build in strange places, and mostly from necessity. The Missel Thrush loves to build in gardens, shrubberies, and orchards, though at other times it is a wild and shy bird. Possibly the owners of the nests referred to by Mr. Ingleby could not find suitable nesting-places in trees or bushes, or their previous nests may have been plundered by prowling cats, who destroy many nests of young song thrushes, blackbirds, and missal thrushes in gardens. The birds, no doubt, finding they could not keep their young from cats or vermin in their ordinary nesting-places, finally built their nests on the top of a high wall, where, it is to be hoped, the parent birds succeeded in safely rearing their broods. In my district, where there is little shelter for the early breeding birds, blackbirds and song thrushes sometimes build their nests in stone walls, and in the roofs of open haysheds. "G. S. B." has fallen into a singular mistake. He intimates—though his statement is not over clear—that he has discovered a Song Thrush and Blackbird mating together, and rearing, we must suppose, a hybrid brood. Had he described how the nest was constructed, the question might easily have been settled. The eggs with "claret markings" were undoubtedly those of the Missel Thrush, and the female which he saw hatching, and which he states was a Song Thrush, was, no doubt, a female Missel Thrush. If "G. S. B." cannot distinguish between the eggs of the Song and Missel Thrush, he would easily jump to the conclusion that the female Missel was, as he states, the Song Thrush. The nest, which he has not described, would be lined with dry grass or hay, if the eggs found therein had "claret markings." The eggs of the Song Thrush are blue with black blotches, densest at the thickest end; though I have several Song-Thrush eggs in my collection which have not a single speck of black upon the blue. The nest of the Song Thrush has always an inner lining of hardened clay or cattle-droppings, while the nest of the Missel is invariably lined with dry grass. This latter bird is a very early breeder. His favourite nesting site is in the fork of a tree, not often very high up. I have seen the nest of a Missel Thrush on the bare branch of a tree projecting over a public foot-path, and the nest was so conspicuous that it was plainly visible at least twenty yards off. The Missel is our largest song-bird, and though in colour and

markings it is not unlike the Song Thrush, yet it is much larger. The cock bird commences to sing very early in the year. In stormy weather it sings best, and on this account the Missel Thrush is called the "storm cock" in many parts of the country. The nest and eggs described by "G. S. B." are those of the Missel Thrush. This correspondent also seems to believe that the Blackbird and Song Thrush breed together. Such an unusual occurrence, so far as I know, has never been recorded by any naturalist; and "G. S. B." cannot be wrong if he describes the eggs in his cabinet as those of the *Turdus viscivorus*—viz. the Missel Thrush. If he is still in doubt as to the identity of his eggs, if he will send me one in a small box, I will name it correctly and return it. At the same time I have no hesitation in asserting, from his description of the nest and eggs, that they are those of the Missel Thrush.—*H. Kerr, Bacup, Lancashire.*

AQUARIUM FOR MICROSCOPIC WORK.—As two or three of my friends, with myself, are anxious to construct a small domestic aquarium (say about thirty inches in length), for the purpose of keeping in stock objects for the microscope, will you or any of your contributors to SCIENCE GOSSIP kindly supply us with information how to make one—size, shape, and material, &c.? I feel certain our thanks, with those also of many of your readers, would repay you or them for your kindness.—*W. D. B.*

"GOOSEBERRY.—Dutch, *Kruis berry*, Cross-berry, from its triple spines forming a cross."

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

M. R. D.—Your species are as follows:—No. 1. *Filago minima*. No. 2. *Filago germanica*. No. 3. *Filago spathulata*; the last species is much more frequent than the first two. No. 4. We should not like to name anything from single leaves. No. 5. *Asopodium Podagraria*; L. No. 6. *Angelica sylvestris*; in future dry them a little before packing them for post, they are then much more easy to determine, because they travel in a better state.

J. C. (Helston).—Thanks for inquiry. Your parcel, No. 2, has been sent.

A. W. ROSLING.—The only Flora of the Isle of Wight we can advise you to purchase is Bromfield's "Flora Vectensis." This is both a valuable and reliable work.

F. H. A. (Fishbourne).—We have several letters expressing the interest felt in "Botanical Work for April." You are quite correct. No. 1. *Viola Reichenbachiana*; a very characteristic specimen. No. 2. *Draba brachycarpa*. Look out for *Ranunculus ficaria*, and its varieties; yours is a good locality for it.

B. M. W. (Hentland, Ross).—The specimens are, as you judge, Micro-fungi. No. 1. *Trichobasis Geranii*, or Geranium Rust. We are unable to detect any perfect fungi on No. 2, perhaps you would send another example when more mature.

SCIENCE-GOSSIP BOTANICAL EXCHANGE CLUB.—Amateur Botanical Collectors wishing to join the Club this year, should as early as possible state their wishes. To save the promoters from any loss, a small charge of say five shillings will be made; this may be remitted when the parcels are sent in October. Rules to guide our members will be sent in May to those only who announce their names. The Rules this season will contain the numbers of species particularly wanted; these numbers will correspond with the London Catalogue, 7th Edition, published by Hardwicke & Bogue, post free, sevenpence.

M. R. D.—The Poison Ivy is the *Rhus Toxicodendron*. You must not, however, confound it with our "rare old plant," the English Ivy, which is *Hedera Helix*. The *Rhus* is used as a remedy for paralysis, but we do not know the results.

S. A. B. (Allan, Dunganman).—The specimen enclosed was *Disandra prostrata*.

D. S.—The leaf-like excrescences are not a fungus, but a gall.

X.—We are not aware that any book has been published on sea-side pebbles except that of J. G. Francis, called "Beach Rambles," which is as full of geological errors as it could possibly be.

B. HOOKER.—Your larva of the goat-moth should be kept in a tin or wire-gauze box, and a large piece of half rotten ash-wood placed with it. It will appear as a moth the third year from its commencing its life as a caterpillar.

D. COOPER.—There is no doubt your specimen is *Clausilia lamellata*, in which the mouth is almost entirely deflected to the side opposite to that on which it is usually found.

R. RAMSAY.—You will be able in your subsequent geological reading to answer your own difficulty better than we can in the short space at our command. But we may say that the reason why it would be futile to bore for coal through the Oolite or Wealden would be on account of the *known thickness* of the overlying formations. 2nd. Your highest Scotch mountains have nothing to do with the thickness of our old red sandstone. The thickness of the latter is known from observing the angle of the dip of the strata, and the area covered by the outcrop. If you study Page's "Geology," you will soon get over your present difficulties. Persevere!

A. SELLS.—Your Zoophytes are: No. 1, *Fuflura foliacea*, No. 2, *Sertularia operculata*, No. 3, *Dosya coccinea*, a seaweed. No. 4, *Sertularia argentea*, Nos. 5 & 7, *Sertularia filicula*, No. 6, *Plumularia falcata*, No. 8, *Antennularia antennina*.

A. WHELDON.—You will find full instructions for "sugaring" for moths, &c., in "Collecting and Preserving Natural History Specimens," published by Hardwicke & Bogue, 192, Piccadilly, at 3s. 6d.

A. G. N.—Your specimen is an English plant, usually found growing in such localities as that you name. It is the curious Butcher's Broom (*Ruscus aculeatus*).

J. W. N. and Others.—It is intended to revise the rules, &c., of the Botanical Exchange Club. Due and full notice of revision, &c., will be given in our columns. Application for membership can then be made.

W. HOBBS.—Very likely your chrysalides will develop early during the coming summer.

J. P. THOMPSON.—We understood that a new edition of Pritchard's "Infusoria" was postponed. Lowndes' "Anatomy of the Blow-fly" can be had of Messrs. Hardwicke & Bogue.

R. B. N.—The fossils are corals, belonging to the Silurian formation. No. 1 is the "Chain-coral" (*Halyssites catenipora*), and No. 2 is *Favosites Gotthlandica*. The small shells which you think look like "cockles" are in reality not bivalves, but specimens of *Molluscoides*. They are fossils belonging to a group (*Brachiopoda*) once as abundant as they are now rare. The name of those enclosed is *Rhynchonella Wilsoni*.

T. MCGANN.—Your entomostracans are the male and female of *Cataglyphis minutus*. Your slides are very well got up indeed.

A. S. A.—Get "Collecting and Preserving," published by Hardwicke & Bogue, 192, Piccadilly, price 3s. 6d., and read the article on collecting butterflies and moths, by Dr. Knaggs, and beetles, by Mr. E. C. Rye.

EXCHANGES.

DUPLICATES.—A number of Lepidoptera in good condition, and well set. Desiderata: Birds' eggs, side-blown, not in my collection.—R. Kay, 2, Spring-street, Bury.

WANTED, Newman's or Stainton's "Lepidoptera." Offered 5 vols. bound, and 3 unbound, SCIENCE-GOSSIP, and other books.—W. E. Green, 24, Triangle, Bristol.

J. W. BULMER, near the church, Northhallerton, Yorks., will exchange Jackdaws, Lapwing's, Song Thrush's, Moorhen's, Stock-dove's, Starling's, &c., birds' eggs, for other varieties of eggs.

WANTED, British or foreign Stone Implements and Weapons of any kind; Stone Hammers, Chisels, Wedges, &c.; also Tools and Weapons wholly or partly composed of stone, relating to any uncivilized race of men.—W. M. Cole, 93, St. Helen's-street, Ipswich.

BIRD'S EGGS, 250 varieties, valuable duplicates, side-blown, including many unprocurable species. Desiderata: Species new to collection. Exchange lists supplied. All letters answered. Sissons, 11, Priory-road, Sharrow, Sheffield.

WELL-MOUNTED Slides of injected human Kidney, Palate of Whelk, and transverse Section of Porcupine Quill, in exchange for others mounted in balsam.—J. A. Kay, Mansion House, Brompton, Chatham.

WANTED, some good Polariscopes Objects, for others or cash.—T. BROWN, 7, Spencer-street, London, E.C.

FOR Elytron of Diamond Beetle, or Skin of Tench or Sole, Polar-mounted, send well-mounted objects or material to Thomas Shipton, Chesterfield.

SLIDE, as announced in last month's SCIENCE-GOSSIP, offered in exchange for first-class prepared material (unmounted). Box must accompany material to be returned with slide.—James Simpson, 15, Prospect-place, Dumbiedykes-road, Edinburgh.

LONDON CATALOGUE, Seventh Edition, Nos. 19, 121, 122, 130, 133, 201, 265, 267, 349, 394, 396, 497, 533, 542, 534, 841 b, 860, 888, 912, 923, 1014, 1040, 1109, 1142, 1310, offered for any of Nos. 775 to 807 inclusive.—W. Jones, Manchester-street, Oldham.

FOR *Zatrachospermum moniliforme* and *Taellaria ventricosa*, both just as collected, send objects of interest.—W. West, Chemist, Bradford.

WANTED, Westwood's "Introduction to the Classification of Insects," for foreign insects (chiefly parasites), mounted or unmounted.—M., Angelsea Lodge, Godalming, Surrey.

WANTED, a few Eggs of Lepidoptera, and Micro-Lepidoptera, whole for mounting, in exchange for really good slides.—T. H. Buffham, Clarendon-road, Walthamstow.

WANTED, a Coddington Half-inch Lens, Matthews or other Turntable, and a Section-cutting Machine. Can offer good Micro Slides, &c.—Wright, 8, Grosvenor-road, Headingley, Leeds.

WILL exchange "Live Stock," Journal, cost 8s., and other books, for back numbers of SCIENCE-GOSSIP, or scientific works. E. Velge, 41, Peckham Grove, London.

WANTED, every description of Mounted Objects and Microscopic Apparatus, in exchange for Mounting Materials. A list sent to all applicants. Foreign correspondence solicited. All letters answered.—E. Atkins, 200, Essex-road, Islington, London.

WANTED, Volumes of SCIENCE-GOSSIP, Coleoptera, or Books on them, in exchange for very large Latin Book on Insects, date 1634. "Insectorum sive minimorum animalium Theatrum." Calf, full of woodcuts of all insects, exchange value 15s.—J. N. Minnitt, 5, Regent-street, Nottingham.

WANTED, Wood Sections, Fish Scales, Hair Sections, and every variety of Unmounted Objects, for Mounted Objects (good).—C. W. Lawton, 200, Essex-road, Islington, London.

WANTED, unmounted, Ripe Capsules of Mosses, Sori of Ferns, cleaned Polycystina and Foraminifera. Well mounted Slides in exchange.—Send postal slide-box for return to T. Sherlock, 32, Exchange-street, St. Helens.

FOREIGN SHELLS.—Duplicates, mostly of Japanese, Chinese, Burmese, Java, and Philippines, Australian.—Desiderata: principally North and South American, West Indian, Mediterranean, Spanish, French, Algerian, and Egyptian; also duplicates of about fifty sorts of British Land and Freshwater Shells for the above desiderata. Exchanges invited.—W. Sutton, Upper Claremont, Newcastle-on-Tyne.

LONDON CATALOGUE, 7th edition, wanted, 1479, 1495 b, 1496 b, 1505, 1511, 1513, 1520 b, 1523 b, 1531 b, 1535 b, 1548, 1572 b, for 1447, 1449, 1448, 1136, 1145, &c.—E. M. Watkins, Treadow, Hentland, Ross, Herefordshire.

A FIRM, substantial, Equatorial Stand for Telescope for exchange. Wanted, a Foot-lathe, good Magic Lantern, or Scientific Apparatus.—Address, H. Morland, Cranford, Middlesex.

MOSSSES.—Wanted, a Northern Correspondent to exchange Species from the West of England District.—Address, E. Wheeler, 31, Triangle, Tullen-road, Bristol.

RARE British and Foreign Eggs to exchange for others not in collection. All letters answered.—J. T. Reed, Ryhope, Sunderland.

WILL exchange any class of neatly-mounted Micro Slides or Material, Diatoms *in situ*; Parasites or their Eggs particularly wanted. Prefer to send stained vegetable preparations unless otherwise requested.—W. Teasdale, Headingley, Leeds.

BOOKS, &c., RECEIVED.

"Popular Science Review," April.

"Land and Water," April.

"Midland Naturalist," April.

"Scottish Naturalist," April.

"American Naturalist," March.

"Science pour Tous," March.

"Bulletin de la Société Belge de Microscopie," February.

"Feuille des Jeunes Naturalistes," January, February,

&c. &c. &c.

COMMUNICATIONS HAVE BEEN RECEIVED UP TO THE 10TH ULT., FROM:—B. H.—D. C.—W. L.—A. J.—H. B.—J. W. D. K.—A. W.—H. A. M.—B. T.—J. F.—Col. B.—E. P.—P. T.—H. K.—T. Q. C.—Dr. E. De C.—W. B. G.—H. F. B.—W. R. M.—F. A. P.—A. P.—G. N. M.—R. N.—C. L. P.—J. N.—R. E. S.—W. T.—W. H. B.—W. J.—J. P. S.—R. R.—J. C.—Col. M.—W. V. A.—W. W.—H. L. G.—B. M. O.—R. H.—W. H. H.—J. C.—E. W.—J. T. T. R.—A. S. B.—T. W.—T. H. E.—J. D.—E. A.—W. E. G.—C. F. W.—W. M. P.—J. W. B.—J. A. K.—Dr. E. H. V.—A. G. N.—J. W. N.—R. K.—W. H. W.—F. H. A.—W. W.—T. S.—T. B.—E. V.—J. C.—J. K.—H. W. S. W. B.—J. W. C.—J. S.—J. T. P.—J. P. T.—H. P. M.—T. S.—H. N. B.—J. W. S.—W. S.—J. McG.—W. E. J.—H. M.—B. M. W.—W. D. B.—J. P.—W. H. B.—G. L. H.—T. W. D.—A. A. B.—E. W. M.—A. S.—H. B.—A. S. A.—G. A.—&c. &c. &c.



THE HABITS, FOOD, AND USES OF THE EARTH-WORM.

(*Lumbricus terrestris*.)

BY PROFESSOR PALEY, M.A.



There is a creature of tolerably large size which one would be disposed at first sight to place lower than most others in the scale of creation, it is the common lob-worm. To an unobserving eye a very simple organism without any particular

head or tail, and possessing only a slightly rough and bristly body of tubular form, composed of contractile rings—from which the class it belongs to is called *annelidae*—it is regarded by most people as a rather ugly, but harmless, wriggling thing, slimy and disagreeable to touch, unsightly to look at, and about as destitute of interest as anything that lives and moves and has an independent existence. But all this is founded on a false estimate, and the false estimate is, as usual, founded on ignorance. The lob-worm may almost be called a clever and intelligent creature; very shy indeed of letting its mode of action be seen, but showing by certain results, which readily come under our observation, that it has instincts which fall very little short of reasoning and design. And yet this creature has “no eyes, nor any other organs of special sense that are known.”*

There are difficulties in ascertaining the habits of the lob-worm, first, from its timidity and watchfulness, next, from its rarely appearing on the surface except at night, thirdly, from its operations being conducted almost entirely under ground. It is immediately conscious of the tread of an approaching foot, or of the least tremor of the earth, such as is caused by digging or any garden-work. In these cases it acts in two apparently opposite ways. If a stick or a spade be thrust deep into rich garden-soil, in which large lob-worms generally abound, and moved to and fro, several of them will crawl out of their holes, even at the distance of a yard, and wriggle

about on the surface. In this way the extraordinary elasticity of the creature may be seen. It can stretch itself out to more than twice its natural length, and its power of locomotion consists in its turnings and twistings, its grasp of the earth by its short stiff bristles, and by forming its head into a kind of hook or anchor, and then dragging its body towards it. But if, walking gently, and towards evening, you chance to see a worm partly out of its hole, it will immediately retire into it. Blackbirds and thrushes may be watched pulling long writhing worms out of a grass-plot, and devouring them; but if you walk across the same grass you will not find a single one. The reason is, that the light hop of the bird does not warn the worm of its approach; the bird sees just the head protruding, and by a dexterous clip and jerk he extracts the delicate morsel, and bolts it whole—alive and kicking.

The lob-worm has a singular habit of filling up the entrance of its hole with fallen leaves, bits of stick or straw, feathers, or any small and light objects—it is rather fond of bits of string—that it finds near. If it cannot get these, it piles up a little hillock of pebbles, or small bits of lime, cinder, &c. Why it does this, it is not easy to make out. Possibly it is to allow the passage of air into the hole, and yet to prevent the intrusion of insects, such as beetles, or ants, which would give it as much trouble and annoyance* as a ferret gives to a rabbit in its burrow. For if it were solely for purposes of food, which fallen leaves or seeds of trees might be, and apparently are, the worm would not draw in such indigestible delicacies as string or feathers. Perhaps they pull in anything that they find soft and yielding, and make trial of its edible qualities at their leisure. Whatever be the reason, the holes are carefully stopped up in the way I have described. This seems, indeed, rather stupid; because a knowing bird may regard the tufts upon worm-holes as so many points for attack; but

* In Mr. Taylor's “Half-hours in the Green Lanes,” a slug (*Testacella haliotidea*) is described as “the terror of the common earth-worm” (p. 211).

* Huxley.

this is the habit of the creature, and as I once, and once only, caught a lob-worm actually at work, I shall describe what I saw, which I thought extremely curious.

My attention was directed to the fact that if the small heaps of pebbles were cleared away from a worm-hole, they were sure to be replaced next morning. Suspecting they worked only at night, I went late one summer evening, after a shower of rain, to a bed in the garden which was very full of earth-worms. Walking up to it on tip-toe, and with extreme care (for I was well aware that if it felt the footstep two or three yards off, it would retire into the hole), I was lucky enough to see one very big worm with its body about half out of the hole. I then stood for some time perfectly still, and watched it as it reached out its elastic head to a small pebble, and by a clever jerk, or possibly, by its slimy moisture adhering to it, it drew the pebble to its hole and left it close to the edge. Thus it took another and another, and now I was able to explain what I had often noticed, that every pebble within a circle of about six inches was moved away and piled up over the hole. The worm took the circle, elongating its body, and moving east or west and to every point of the compass, so to say, till not a pebble was left within its reach. This I saw, and the reader may believe that it is a strictly accurate account, though it may seem to credit the creature with more intelligence than it has any right to possess.

I believe the same may be seen by anyone who will take a lantern into the garden late on a summer's night, for they can hardly be conscious of light; even of this, indeed, I have sometimes entertained a doubt, though I cannot explain it in an eyeless creature. Certain it is that on gently uncovering a pot of earth containing a lob-worm, and bringing a candle to examine it, when it happens to be above ground, the creature will almost always immediately disappear.

But the feat which I saw performed is nothing to what I am going to describe. I found on a gravel path in my garden, and on the grass-plot adjoining, a number of worm-holes, all stopped up with the long narrow leaves of the weeping willow, which had fallen in the late autumn, and had been placed erect in small bunches. On examining separately a number of these leaves (of which each hole contained on the average about twenty, though many of them had more), I found, to my surprise, that every leaf had the stalk-end uppermost, and the other end rolled together into a kind of plug so as to fill up the hole. Very rarely indeed, perhaps in one or two out of a hundred leaves, the creature had made a mistake, and put the stalk-end downwards. But in these few leaves the end was quite entire, whereas the leaf-plugs in general seemed to have been nibbled or partly eaten at the ends within the holes. Evidently the stalk-ends were too tough, and the worm had the extraordinary intelligence, blind as of course it

is, to find out by the touch the right and the wrong end, and to make use of each leaf accordingly.

The mouth-end (so to call it) of a lob-worm has many analogies to an elephant's trunk. It can curl it and twist it, make it blunt or sharp, curved or hooked, as it pleases; and it is evident that an acute sense of feeling resides in it. Therefore, recklessly to chop worms in half with a spade, on the plea that they do not feel, or to impale them on fish-hooks, is cruel, even though we take old Walton's advice and perform the operation "tenderly."

Worms feed by a kind of suction, as well as by digesting vegetable fibre; they pass earth through their long tubular stomachs, and eject it on the surface in those little hillocks which we call worm-casts, and which so much disfigure our closely-mown lawns, till we flatten them down with the garden roller. But these worm-casts perform more than one very important function.

(To be continued.)

BOTANICAL WORK FOR JUNE.

IN taking our usual daily walk in the spring months, we have often seen the Chickweed, Marsh Marigold, and Water-blinks. We select these species because they are so common as to be generally passed over with the remark, "Oh, it is only the Chickweed," and so on.

Stay, however; not quite so fast. The poor Chickweed, despised because it is so common, covers, without doubt, three distinct species. As the result of a careful examination, extending over twelve years, we now regard this despised plant with deep interest, and, at a glance, can detect the three species we now lay before our readers:—

First.—The *Stellaria media*, Linn., may be recognized by the line of hairs on the stem and branches.

1. The true *S. media*, Linn., has five stamens; petals invariably present.

2. *S. boreana*, Jord., is devoid of petals; stamens three.

3. *S. neglecta*, Weihe. Sepals with long hairs, often as long as the petals; stamens ten. Note.—We are unable to detect any good specific distinction betwixt *S. umbrosa* and *S. neglecta*.

Further.—No. 1 has showy flowers, with few branches, about four inches long. No. 2 is a small tufted plant; branches very short; flowers inconspicuous. No. 3 is not unlike dwarf specimens of *Stellaria nemorum*, L.; branches sometimes eighteen inches high; leaves large; flowers large.

Our next species is the Marsh Marigold (*Caltha palustris*). For many years we overlooked this species, but now it seems like an old friend altered by long absence. It is split up into three varieties; but we now only notice those which are common, or

of frequent occurrence, so as to throw a new charm to our spring rambles :—

Caltha palustris, L.

1. *C. vulgaris*, Schott. Flowers large, one and a half to two inches across; sepals meeting at the margins; follicles (seed-vessel) with a short beak; branches stout, very few.

2. *C. Guerangerii*, Boreau. Flowers numerous, very small; sepals spreading; follicles with a long beak.

No. 1 is generally found in swampy situations; No. 2 in brooks, &c.

Another plant is often overlooked, the lowly *Blinks*.

Montia fontana, L. In this instance new names have been introduced to distinguish each separate plant.

No. 1.—*M. minor*, Gmelin. Stems short and tufted; flowers inconspicuous; tubercles on seed with a raised point. This bears a striking resemblance to *Stellaria Boracana*, Jord.

No. 2.—*M. rivularis*, Gmelin. Stems long, solitary, thick and flaccid; tubercles on seed with flattened point.

We regard No. 1 as a very distinct species; it alters not in a state of cultivation, but is rather rare in the northern counties.

Who does not recognize with feelings of delight and joy the pretty Milkwort? (*Polygala vulgaris*, Linn.) Probably no British species has been split up more frequently, if we except the Rubi. After years of toil in looking up these sub-species, and after examining, may be, thousands of specimens, we have come to the conclusion that the so-called *P. vulgaris*, as originally described by Linnæus, includes two well-marked forms, as follows :—

No. 1. *P. vulgaris*, L. Racemes, many-flowered; leaves scattered, lanceolate; branches numerous, ascending.

No. 2. *P. depressa*, Wend. Racemes few flowered; flowers small, white or pink; leaves often tufted below, or crowded thickly on the stem just beneath the flowers, becoming opposite, all linear. This is a pretty species.

There are other varieties, such as *oxyptera*, *grandiflora*, &c., but the characters are so liable to variation, even on the same plant, that it is difficult to distinguish them without close inspection, but the above have generally constant characters. F.

THE DATE-PALM.

PHENIX DACTYLIFERA is the name given by Linnæus to this very important member of the vegetable kingdom. *Phoenix* is the Greek name of the date, and is probably derived from Phœnicia, whence the best dates were brought. Its origin, like that of so many of our cultivated fruits and vegetables, is unknown, but it may reasonably be sup-

posed to be a native of Arabia and Persia. In very ancient times it was cultivated in Egypt (in the Museums of Economic Botany, Royal Gardens, Kew, is a specimen of "mummy bread" which is apparently made of dates, such bread being frequently found in jars in the tombs at Thebes) and in North Africa, from which countries it was introduced very long afterwards, probably by the Arabs, into South Europe. It is a noble tree, attaining under favourable conditions a height of from 60 to 100 feet. The stout stem, which is very rugged, owing to the persistent bases of the decayed leaves, is surmounted by a large head of feathery leaves, 12 to 20 feet long. The flowers are produced on large branches, which spring from the axils of the leaves. Each inflorescence is at first enclosed in what is called a spathe, which afterwards falls away. As many as 10,000 flowers have been counted in one spathe, and, as one tree will produce many spathes at a time, some idea of the total number of flowers may be obtained. Each tree bears flowers of one sex only; therefore cross fertilization is necessary. It is said that in times of war the Arabs cut down the male dates belonging to their enemies, the result being of course a total failure of the date crop. In "Hortus Collinsonianus," occurs the following memorandum :—"At Berlin was a large date-palm, at Leipsic was another, which was the male; both made attempts to produce fruit, but imperfect, as these trees are of different sexes, the Berlin tree being the female; anno 1749, they married the two trees by carrying a branch of male flowers and impregnating the Berlin tree; and then it produced good fruit, from which young trees have been raised, but this espousal must be done annually."

To the inhabitants of many countries the importance of the date-palm cannot be over-rated. The pulp of the fruit serves them and their various domestic animals for food; and even the extremely hard and apparently useless stones are ground and given to their camels. The young undeveloped leaves are eaten as a vegetable; in a mature stage they are made into bags, and are the sole material used in constructing the huts of the common people. The stalks of the leaves, when softened by boiling, serve as food for camels; and numbers are imported into this country for the manufacture of walking-sticks. From the stalks also, excellent baskets and crates are made. Timber for the houses of the better class is obtained from the stems, which also furnish an inferior kind of sago. The fibre, called "lif," from the bases of the old leaves, is converted into ropes and a sort of coarse cloth. The heads of trees not bearing freely are cut off, and the trunks scooped out. Into the hollows thus formed, the sap rises at the rate of from three to four quarts a day; this quantity is kept up for one or two weeks, after which it gradually diminishes: in six or eight weeks the trees become quite dry, and are used either as timber or firewood.

The syrup-like juice obtained as above described is turned into an intoxicating beverage by fermentation; and sugar is procured from this juice by mere boiling.



Fig. 84. Leaves of Date-Palm, covered with fungus (*Graphiola phaniceis*).

It is very probable that the palm-branches carried before Christ on His triumphal entry into Jerusalem

were the leaves of this tree. Various branches of the Christian Church, by their use of date-palm leaves in decorating their churches on the anniversary of this event, and the Jews, by their use of them during the Passover, uphold this idea. For these purposes vast numbers of trees are cultivated, especially in the neighbourhood of Bordighiera, on the Sardinian coast. Collinson says, "Mr. Bowles writes me . . . the upper branches they tie up to turn yellow, and then sell them to adorn churches and houses to keep away the devil; they have the art of managing them."

Without the date the Sahara would be uninhabitable. In every spot where there is any water this tree flourishes, furnishing shelter to the traveller from the fierce tropical sun, and food for himself and camels. Very many varieties, differing much from each other in colour, size, and shape, are cultivated, each known by its own particular name. Some travellers mention as many as forty-six; and twenty-six distinct varieties are exhibited in the Kew Museum. The date is fast disappearing from the Holy Land, where at one time it seems to have been very abundant. Moses refers to Jericho as the "City of Palms," and we have the testimony of Pliny in his Natural History that palms abounded in Judea and the surrounding regions. On several of the coins of Titus, Domitian, and Trajan the country is represented by the symbol of a palm-tree.

Formerly dates were credited with many medicinal virtues. In some old herbals a decoction in red wine is recommended for the piles. The date's prevailing qualities are nutritious and saccharine. One pound of dates might produce about one ounce of the dry nitrogenous substance of muscle or flesh.

In conclusion, we may observe that the date-palm may be seen growing in many collections in this country, notably a very fine specimen in the large conservatory at Sion House, the residence of the Duke of Northumberland. In the Palm House at Kew there is a much smaller one with an abundance of a parasitical fungus on its leaves. This fungus, which bears the name of *Graphiola phaniceis*, and seems partial to *Phoenix dactylifera*, attacks several other species of the genus. GEO. NICHOLSON.

A LESSON FROM A FAGGOT-STICK.

THE object of this short paper is to show what pleasure may be derived by the observer of nature, from the contemplation of the most unlikely and commonplace objects, and how numerous are the sources from which instruction may be gathered to serve as a lesson in entomology.

Those who are happily acquainted with this part of Kent, to whatever county they may belong, and to whatever part of the world they have travelled, or may hereafter travel, will gladly confess that it

possesses points of beauty and interest which are not easily surpassed by those of any other county, and which entitle it to a place in the memory as a county of singular beauty, well deserving the appellation it has gained, "The Garden of England." Its graceful swelling hills are everywhere mantled with woods, sepia-tinted in winter, emerald-green in spring; fuller, deeper, and richer-hued in summer, and splashed with purple, gold, and bronze in autumn. It would, indeed, be difficult to say at what season of the year they are most attractive.



Fig. 85. Tracks of *Hylisius fraxini*.



Fig. 86. Imago of *Hylisius fraxini*, natural size.



Fig. 87. ditto magnified.



Fig. 88. Larva of ditto.



Fig. 89. General form of main track or channel.

Many of these woods are devoted to the growth of a kind of underwood for the sake of hop-poles, faggots, &c. They are allowed to grow for a period of about seven years, and are then cut down; the trees are lopped to within a foot or two from the ground. This frequently-repeated act of cutting down causes the stumps to assume the most fantastic and picturesque appearances. They are often decorated with an elegant drapery of clematis, ivy, black briony, briony, and other climbing plants, and the graceful polypody hangs its waving tufts from their wrinkled sides. Among the trees so grown may be enumerated the horn-bram, hazel, chestnut, ash, white-bram, oak, cherry, maple, &c., so that the

woods present considerable variety to the wanderer. Beneath their shade grows a great selection of wild plants, decorating the earth as with a coloured carpet. During April these woods are gay with anemone, primrose, cardamine, two or three species of viola, and the golden pilewort; while a little searching discovers beautiful cushion-like masses of *Adoxa moschatellina*, the tropical-looking spurge-laurel, with its hanging clusters of yellow-green sweetly-scented bells. The curious, unhealthy-looking *Lathraea squamaria*, growing from the roots of the hazel, and other trees, upon which it is parasitic, trailing branches of ground-ivy, and the sweetly pretty *Oxalis acetosella*.

The faggots brought to our doors for lighting fires contain specimens of all the trees above mentioned, and many an interesting botanical lesson may be gathered from their examination. The nature of the bark, the formation and arrangement of the buds, the peculiar scars left by the falling leaves, and other points, may be well studied from these. When winter winds are howling round, and torrential rains are drenching the earth, we may well fly to the study of such objects as these for recreation and instruction.

About the end of the month of June I had occasion to hunt through one of these faggots in search of a stick for the amusement of one of my children. I picked up a straight branch of ash, which appeared just to suit my purpose, and commenced to cut and trim it. To my surprise, although looking perfectly fresh and sound, I found the bark almost completely separated from the wood below, and the space between the two filled with a fine sawdust-like powder. Fixing my attention a little more closely upon the twig, I now noticed that the bark appeared as if riddled with small shot, as shown in the upper part of fig. 85. On stripping the bark, and blowing away the dust alluded to, I detected a groove, originating below a leaf-scar, which, after passing under the scar, branched off in opposite directions, as seen in fig. 85. Springing from these grooves were now clearly discernible a great number of shallow channels, separated from each other by the merest film of wood; each channel widening out in proportion to its distance from the main groove. At the end of each of these branching channels I found a small, fat, active little grub busily engaged extending its passage, the wood forming its food. I now, of course, saw at a glance the meaning of all this loose dust and apparent rottenness, and the origin of these main and lateral canals. It appeared quite clear that the main ducts were made by some insect, that eggs were deposited at minute intervals, on both sides of these tracts, that these eggs were finally hatched out, that the grubs so resulting immediately commenced feeding, travelling continually away from the centre, and that as they waxed in stature they necessarily enlarged their tracts.

Having proceeded thus far in my discoveries, and

my interest being thoroughly aroused, I determined to prosecute my search. For this purpose a number of ash-branches were selected, and carefully laid on one side. A cursory glance at these showed nothing at all abnormal or noticeable, but a more careful examination disclosed a number of small ridges of discoloured skin traversing the branches in various directions. Taking off the bark at these points, the main passage before-mentioned was exposed to view. On tracing this up or down the stem it was always found to terminate below an old leaf-scar. Finding this, I now examined the leaf-scars, and in a majority of cases found a small hole filled below with fine dust. Detaching the skin at this point a small run was visible, passing just below the scar to the right or left; and when clear of it branching off in two opposite directions up and down the branch (fig. 89), but usually more or less spirally arranged. At the entrance to this passage was generally found a small beetle, and another some distance along. There were mostly two, but whether they were male and female, or whether they were both females acting in concert I was not able to determine. The diameter of the principal passage is about 1-16th in. The beetle I found to be *Hylysinus fraxini*.

It appears to be very prolific, and must be very destructive to the trees it attacks. In the cases I examined there were usually from 60 to 80 diverging passages, and at the end of each, as before-stated, was a fat larval beetle, busily engaged excavating for its daily rations. In many branches, almost every node was the starting-point for these channels, and the amount of mischief done to the tree may well be imagined when we bear in mind the numbers found in each run, and their method of working side by side so closely as to all but completely sever the bark from the wood. After examining a great number, a few specimens were put on one side for the purpose of watching their progress towards maturity.

On the 28th August the now-transformed larvæ began to emerge in the imago form, *i.e.*, as perfect winged beetles. They were pretty little insects, varying considerably in colour, some being much lighter than others, and most distinctly clouded. On raising the bark I found a great number still occupying their snug quarters, where they had fared so comfortably during their early days, and where they had undergone their final change preparatory to entering upon a more active and greatly extended sphere of action. I now found that, prior to undergoing their first metamorphosis, *i.e.*, assuming the pupa form, they sink for themselves, at the end of their respective galleries, a comparatively deep pit, in which the change takes place. In these pits they may be found in August ready to make their way out previous to setting up housekeeping on their own account.

Noel Humphreys gave an interesting account of these beetles in the pages of the "Intellectual Ob-

server," in 1862. He there states that they attack the elm as well as the ash, and that their ravages are often terrible. The ash, however, is their favourite tree, as may be gathered from the specific name (*Fraxini*) of the insect.

Having thus learnt how numerous and destructive these insects are, and remembering that in a row of ash-trees that I passed daily some were flourishing grandly while others were dead or dying, I determined to ascertain whether these beetles had anything to do with the matter. On examining the dead and dying trees, I found them literally riddled with minute shot-like holes—the significance of which was now only too plain to me. I had often noticed the difference between these trees, whose conditions, as to soil, climate, &c., appeared to be identical, and wondered what could be the cause of the death of these, while those by their side grew vigorously. Had I noticed these holes a few weeks earlier, their meaning would have been hidden from me, but now, from the study of a few faggot-sticks I was able to understand most clearly what had been going on beneath the bark of these unfortunate trees, and why they had gradually, without any apparent cause, drooped and died, branch by branch and limb by limb, until a giant mass of mere dry sticks remained, rearing its weird and awe-inspiring form against the sky.

Thus, from the careful examination of a "faggot-stick" I gathered the life-history—or at all events the leading facts in the life-history—of a pretty little British beetle, which undoubtedly plays an important part in the "struggle for existence," which ultimately results in the "survival of the fittest," that has to compete in common with every other member of the organic world.

Rochester.

JOHN HEPWORTH.

WHAT A DIATOM IS.

(Continued from page 107.)

IT is the act of generation that brings back the normal size of the frustule, already reduced in dimensions by repeated deduplications; if this did not take place, the diatom would (theoretically) at last become a mere atom—a circumstance which never takes place.

The act of generation, properly so called, may be said to consist in all organisms of a simple amalgamation of two more or less distinct particles of protoplasm. The diatoms are no exception to this rule, and with them this union comprises either the contents of two distinct frustules, or of differentiated protoplasm contained in a single frustule. This phenomenon is called the *conjugation* of the Diatomaceæ. The study of the phenomena of conjugation in some forty species of diatoms, by various distinguished microscopic observers, has not furnished us with such complete

results as we might desire, and the greatest circumspection is necessary in the interpretation of the facts observed. That which we appear to know for certain is that conjugation takes place in diatoms, and that the material result of this is the formation of what is called a *sporangium*. This proceeds either from the condensation of the protoplasm and endochrome contained in the interior of a single frustule, of which the valves are separated in such a manner as to enlarge the internal capacity of the frustule, the matter thus amassed giving place, according to the species, to the formation of one or two bodies, more or less round or oval; these very soon secrete on their surfaces a hard shell (*test-resistant*). These are the Sporangia, or the intimate union and fusion of the protoplasm of two contiguous frustules that have partially opened along the sections of the connectives for its liberation. Here also is formed, according to circumstances, one or two sporangia. When the sporangium [is produced by a single primitive frustule, it is probable that the original primordial utricle, which was already previously divided into two for the purpose of deduplication before the secretion of the new siliceous valves, and that the sporangium, formed of the differentiated protoplasm, produces that of the two young utricles. This, however, requires to be verified by direct observation. In both cases there is promptly developed in the interior of the sporangium a special body, which varies in form according to the genus, which grows rapidly, and which possesses an envelope rich in silica, and is able to resist calcination and the action of concentrated acids; it is often wrinkled across the external surface; this is the *Auxospore*. This last is the analogue of the zygospore of Zygnemaceæ. Its growth at last bursts the sporangium, and carries with it to its apices, the two halves of the sporangium-like little caps.

When the auxospore has attained a size generally double, or even more, of the frustule that has originally produced it, we discover in its interior, lying across the envelope, the valves forming the new frustule. These last are apparently the product of a true generative act, and which we are justified in considering for the moment as sexual, although our means of observation up to the present are much too imperfect to permit of our being able to distinguish the male from the female element in the products of conjugation. The first frustule is called the *sporangial frustule*. With this is destined to commence a new cycle of vegetative generations by deduplication, which continues up to the moment that a new conjugation takes place. It restores also the normal size of the frustules degenerated by the repeated deduplications, and we see here the singular phenomenon of the child being at its birth much larger than its parents. The sporangial frustule is always enormously large in comparison with its parents, the empty valves and connectives of which are generally retained by a mass of gelatinous matter secreted previous to the act of con-

jugation. We believe that other modes of reproduction exist in the diatomaceæ beside that of conjugation, but the biology of these little beings is much too imperfect to enable us to hazard any profound hypothesis on this subject. It is evident that all the frustules do not finish by conjugating; this is highly improbable, when we consider the rarity of that phenomenon. Some other explanation is necessary to account for the variations in the dimensions we meet with in the different individuals of the same series other than that of deduplication, as without it those frustules that escape conjugation would go on diminishing in size indefinitely, and we know from observation that every species of diatom possesses a maximum and minimum of dimension which it never passes.*

The rapid appearance of species where they did not previously exist—their periodic succession at determined seasons, and which we had never been able to find in the intervals in the same locality—this presents the possibility of a mode of generation which is only yet suspected, by germs, by micro or macro-zoospores, possibly even in the first case with the formation of zygozoospores, as it takes place among many of the inferior algae who live under the same conditions as the diatoms.

We enter here a field of study of the greatest interest and novelty to every naturalist furnished with a good microscope, and possessing time and patience necessary for such researches, and we dare affirm that any member of a microscopical society who shall follow with care the entire life cycle of a single species of diatom, even the commonest, will probably render a greater service to science than if he had described and figured hundreds of frustules from the four quarters of the globe.

Note.—In a communication† to M. Deby, Professor H. L. Smith makes the following remarks:—

“I have received your brochure, entitled, ‘Ce que c’est qu’une Diatomée,’ for which I thank you. What you say is generally correct. I have myself published a part in the ‘Lens’ in 1873, but I entirely differ from you on certain points. The communication which you say exists between the internal protoplasmic substance and the external medium does not take place, as you say, along the sutures of the connective, but in the naviculus, properly so called; it exists along the raphe or median line, and in the Nitzschias and Surirellas along the alæ and carinæ. (This is an interesting confirmation of Ehrenberg’s observations, who had also studied this phenomenon many years before J. D.) I possess drawings showing the injec-

* The process of self-division, no doubt, gradually exhausts the vigour of the sporangial frustule, but this power is possibly retained longer by some individuals than others (thus bearing a striking resemblance to parthenogenesis in the Aphides, &c.), but there is probably no fixed limit. I have seen much smaller valves of *Aulacodiscus Kittoni* in a New Zealand gathering than in a copious and pure gathering from Vera Cruz.—F. K.

† A translation into the French appears in the *Bulletin de la Société Belge de microscopie* for Dec., 1877.

tion of indigo along the median line, and its penetration into the interior of the diatom, particularly in *Stauroneis* kept for some days in indigo water. Beside this demonstration, I was able, by the employment of the pigment, to obtain a glimpse of the mode of progression in the large *Pinnularias*. I am half tempted to send you my drawings. Many cases of conjugation are not always so simple as is generally supposed.

"When a large *Pinnularia* is observed in the field quite blue with indigo, we see in side-view (fig. 90) little particles of indigo running along the (X) raphe as far as the end of the median line; here they accumulate into a little ball, at C. In fig. 90, *a b*, a little ball is seen on each side, but that which is most surprising is, these balls revolve on their axes. When the ball acquires a little size it suddenly breaks, and the particles sail off in the direction *a e* (fig. 91), and a new ball is again formed; this is on supposition

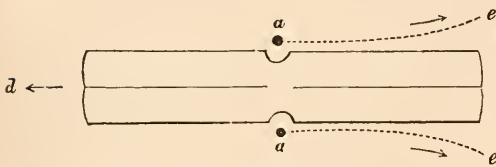


Fig. 90. Side view of *Pinnularia*, showing balls of Indigo running alongside.

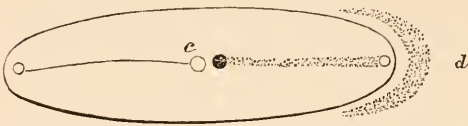


Fig. 91. Diatom, showing mode in which ball of Indigo breaks.



Fig. 92. Diatom in act of Deduplication at *a* and *b*.

that the frustule is moving in the direction of the arrow *d*. Moving the other way, the particles slip down the other half of the median line or raphe, and form a little ball, as before, at its end. I have watched this for hours, and I can assure you that it is a glorious sight. I had some magnificent large *Pinnularias*, and these effects were best seen when the motion forward of the frustule was prevented by its coming in contact with some particle of sand or dust. The colour in the field was the ordinary indigo-blue water colour, pretty thick. Furthermore, there always appeared a gelatinous envelope which prevented the actual contact of the indigo particles with the frustule, which, as it moved forward, pushed them in advance, as at *d* (fig. 90). The slightest application of aniline red (Fuchsine) demonstrates the

external gelatinous covering by the absorption of the colour, even before the colour is seen elsewhere in the field, but this aniline instantly arrests all motion of the diatom.

"The act of deduplication of the primordial utricle is effected with great rapidity; it manifestly commences at the two ends of the frustule at the points *a* and *b* (fig. 92); the membrane there forms a fold, which is gradually prolonged until it reaches the central nucleolar mass; this occupies about six minutes from the commencement of the phenomenon.

"I have never been able to perceive a true circular nucleus in *Pinnularia major* (Ehr.), but it is very visible in divers species of navicula, such as *N. firma*, and in the *Stauroneis*. It is very manifest in the *Suirellas*. The frustules only separate from each other in seven days, rarely before. The conjugation in the *Pinnularias* continues for four days before the act is entirely completed. I have followed it step by step, and measured with a micrometer the sporangial development. . . . I remain, &c.,

"H. L. SMITH."

(The above experiments are of great interest, and will, I hope, be repeated by other diatomists. The study of the living frustule has, I fear, been too much neglected for that of the dead valve, the diatomist having been seduced by the elegance of its contour and the beauty of its ornamentation. If, as Professor Smith describes, the communication with the interior of the frustule is through minute apertures at the termination of the raphe or median line, it is evident that those forms which do not possess this line, and are neither alate nor carinate, must possess some other means of communication; in the *Aulacodisci* this may be by means of the processes which are apparently perforate, but in the *Triceratia*, *Coscinodisci*, &c., I think M. Deby's suggestion, that it takes place at the margins of the connectives, is probably correct.—F. K.)

Those interested in the structure of the diatom frustule will find much valuable information in the papers of Dr. Wallich, particularly that published in the *Monthly Mic. Jour.*, Feb. 1, 1877. A paper by the same author, entitled "Are the Desmids and Diatoms simple Cells?" will be found in the April part of *Popular Science Review*, 1877.

A GLASS-EATING LICHEN.

ON visiting an antiquarian friend, to whom I am indebted for the loan of specimens, &c., some old stained glass of about the fifteenth century was submitted to me, and an opinion asked as to the cause of certain irregular worm-eaten-looking holes of some depth, occurring generally only over one surface of the plates. My friend informed me that it was publicly discussed some twenty years ago as to its cause, for it had often been observed in old glass windows. At

first, on carelessly looking at it, it appeared to be explained by that disintegration which gives rise to those beautiful iridescent scales on old glass, and especially in the old black glass Dutch bottles, whose surface, on removing the scales, presented somewhat the appearance described. My friend informed me it was considered by some to have been made by the

95 is a portion seen by reflected light of the surface of some dark green glass twice its natural size, which shows the general arrangement. On submitting them to microscopical examination, to my delight, all the edges of these masses appeared to be spiked, and, although they had been in my friend's possession for thirty years, showed the cellular structure delineated in fig. A (Hartnack, ob. 7, oc. 2, tube drawn out), being the portion C of fig. B (Hartnack, ob. 4, oc. 4, tube in). I have shown them to two botanists, who are quite satisfied as to their nature; but they asked the question as to whether they might not be lichens which had occupied already existing holes; this, however, was capable of denial on the following grounds. It will be observed in fig. D that the bodies commenced to grow at certain points, but as they became larger they also became confluent, forming irregular masses with a serpiginous margin, to which the depression in the glass always corresponds; the central portion of each depression is level, and however large it may be, it is of the same depth, the steep edges

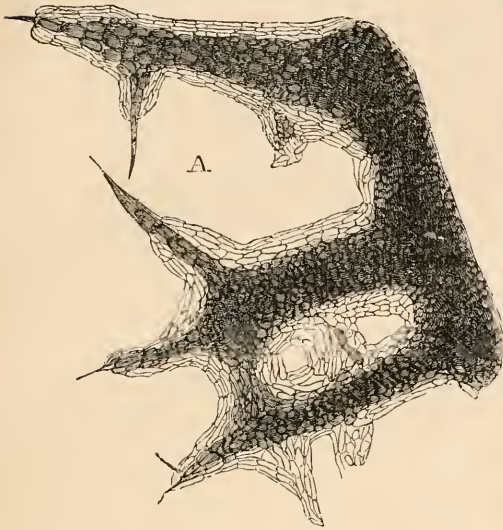


Fig. 93. Cellular Structure of Glass-eating Lichen (mag.). See fig. 94, at c.



Fig. 95. Lichen as seen by reflected light on green glass.

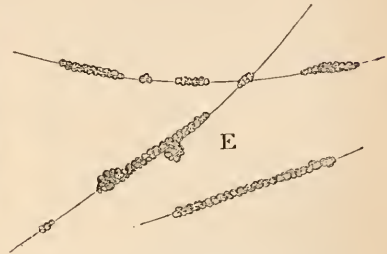


Fig. 96. Erosions running in nearly straight lines.



Fig. 94. Glass-eating Lichen (mag.).

workmen, to give a better effect to the light; but the irregularity sets that question at rest directly, though it stimulated me to look into the matter more carefully, and on a careful examination I was fully satisfied that each depression was occupied by a small lichen, such as we see covering grave-stones; at figure

being occupied by the growing processes which seem alone to have the absorbing power; and lastly, on removing the growth by various re-agents, the exact figure of the points and even in some instances of the individual cells, are seen beautifully cut and embossed upon the glass. It occurs on the side opposite, and not on the painted side, which, in glazing, is placed on the inside of the window, and therefore would be unfavourable to the growth of these plants; neither does it occur round the edges, which are overlapped by the lead. One point was at first puzzling; these erosions sometimes appearing to run in straight lines, as seen in fig. E; it could, however, be demonstrated by a magnifying glass that it occurred along old scratches, the rough surface of which had afforded the most easy attachment for the spores and young plant. It is to my friend, Mr. T. Coates Archer, to whom I am indebted for the specimens, and also for a few notes as to their history. They are from the Church of Little Dunmow, in Essex (celebrated for the annual distribution of a flich of bacon), from which it was removed by some glazier of Felsted, from whom my friend bought it, and has now had it over thirty years.

The remarks may at first appear to be of little interest, but in putting them forward it is with the hope that they will teach us to at least take precautions to protect or remove such an unpleasant enemy from some of the most beautiful works of art.

H. T. JOHNSTON-LAVIS.

ON PREPARING AND MOUNTING LEAVES
AND OTHER PARTS OF PLANTS TO
SHOW THE CRYSTALS *IN SITU*.

By W. H. HAMMOND.

EVER since I first began to use the microscope Plant Crystals have been objects of interest to me, not only on account of their great beauty as "objects," especially with the polariscope, but also because they open a new and comparatively unexplored region of phytotomy; in fact, except in Professor Gulliver's writings, they are hardly mentioned, or very summarily dealt with by other botanical writers. At first I used to be content with a sight of them after boiling and mashing parts of plants, but I soon became dissatisfied with this method, and began to look about for some means of examining the crystals just as they grew in the different plants; fortunately I happened to look at a back number of SCIENCE-GOSSIP (January, 1875), and came across a paper by the late Dr. Beatty, "On Decolouring and Staining Vegetable Tissues for Microscopic Examination"; other papers, by Dr. Beatty, came out afterwards, and I gathered many valuable hints from them on the subject.

I am often asked how my preparations are made, so I will describe my process of preparing and mounting, for the benefit of other workers with the microscope who are interested in these beautiful, but much neglected, marvels.

The first thing to be done is to get the bleaching solution, and this may be very easily prepared as follows:—Equal weights (say four ounces) of chlorinated lime and common washing soda, both in fine powder, are put into a half-gallon bottle of cold water, and well shaken together, then left to stand till the fluid is quite clear, this is poured off gently into another bottle, and a strong solution of washing soda added as long as a white powder is thrown down. The mixture is again left till clear, and then poured off; this is the bleaching fluid. The original substances in the first bottle may be again treated with cold water. Leaves and other tissues are kept in this fluid till bleached and semi-transparent, large or thick leaves should be cut up into small pieces. I find the small, round night-light glasses, which may be bought for a penny each, are very convenient for bleaching the tissues in, and also for the dyeing and subsequent soakings, covering them over with pieces of glass to keep out the dust. It is not always convenient to

prepare and mount leaves directly they are gathered, so I always carry with me a small account-book, interleaved with blotting paper, and with an elastic band round it; leaves are put into this when gathered, and by carrying it in the breast-pocket of the coat, they are soon dried by the warmth of the body; in the summer time several books full of leaves are collected, ready for the long winter evenings. Dried leaves will bleach sooner than fresh-gathered ones.

Having bleached some leaves (the time it takes to do this varying very much), they must be well washed in warm water in basins or pie-dishes, changing the water often for about two days, and brushing the tissues with soft camel-hair brushes. I often find it of use to put the plant tissues into acetic acid and water for about a minute before the final washing, but acids must be very cautiously used, or the crystals may be dissolved.

The leaves or tissues are then ready to go into either of the following dyes:—

The carmine dye is prepared partly according to Dr. Beales's formula, viz. :—

Carmine	20 grains.
Strong liquor ammoniac ...	½ dram.
Pure water	4 ounces.

The carmine is heated in a test tube with the ammonia till dissolved, and then added to the water in a bottle and well shaken, and left to settle or be filtered. The dye should smell strongly ammoniacal. Sections are soon dyed in the above, but leaves take several days, or a week or more. Sections of the India-rubber plant leaf, or of the common fig, dyed in carmine, will show the stalked crystals, called cystoliths, very nicely; pieces of the leaves of the fig, hop, nettle, wall-pellitory, or wych elm, dyed, will show the cystoliths when viewed from above or below. I generally mount two leaves or pieces on the same slide, one with the superior and one with the inferior surface uppermost.

The logwood dye is prepared according to the prescription in Rutherford's "Histology."

A. Make a saturated solution of calcium chloride in 70 per cent. alcohol, and then add alum to saturation.

B. A saturated solution of alum in 70 per cent. alcohol.

C. Add A to B in the proportion of one to eight.

D. A barely alkaline saturated solution of logwood in water.

Add D to C till a deep violet-coloured dye is obtained.

I make D by boiling logwood chips with water and a very little potash, then filtering.

I generally use methylated spirit where alcohol is recommended.

The leaves and tissues may be immersed in either of the above dyes, straight from the last wash-water, and will be dyed in either in about the same time.

Tissues when dyed must be put into clean water, then, if dyed with carmine, into acetic acid and water for a minute; if dyed with logwood they must be put into alum and water, they must then be put into two changes of clean water and brushed with soft brushes. The remaining operations will be described further on.

I also use a blue dye made by pouring six or eight drops of Judson's aniline blue into an ounce of methylated spirit, shaking and filtering. Leaves and sections to be dyed in this must be soaked in methylated spirit for about a day after being taken out of the last wash-water. After dyeing they must be washed and brushed in methylated spirit. Leaves generally require to be kept in this dye for about a week. Leaves and sections after undergoing these operations may either be mounted in Deane's gelatine medium or in dammar or balsam dissolved in benzole. I like to have specimens of the same kind of leaves dyed in all three colours and mounted both ways, or only the blue-dyed ones mounted in balsam or dammar.

Leaves or sections, which are to be mounted in Deane's medium, should after the final washing, after dyeing, be put into the following solution as recommended by Mr. Deane, for two days:—

Rectified spirit	1½ ounces.
Pure water.....	1½ ounces.
Pure glycerine	5 drams.

Take the tissues out of the above fluid, drain off as much as possible and mount in the medium. I prefer this way of mounting for most leaves and other tissues, for this reason, it does not make them so very transparent as dammar or balsam does, and generally every cell-wall is distinctly seen, the crystals in the cells, the hairs, and every other part of the leaf.

Leaves to be mounted in dammar or balsam should be thoroughly dried from the last washing, after dyeing, this is best done by putting them into one of the before-mentioned interleaved books, and carrying in the pocket for a day or two. When thoroughly dry take them out and put them into a small wide-mouthed bottle, pour over them benzine enough to cover them, and cork up tightly till perfectly transparent. When ready to mount, take the leaves out of the benzine, drain, but do not dry them, and mount quickly in balsam or dammar dissolved in benzine (benzine collas is the best benzine to use). Leaves mounted in this way are beautiful objects for the micro-polariscope, if they contain crystals or have hairs upon them, but they are nearly always so transparent that the cell-walls are quite obliterated.

Good leaves to experiment upon, for sphaeraphides, are Chickweed, Mercury, Wild Strawberry, and many of the Rosaceæ.

For long crystal prisms—the outer skin of the Gladiolus Bulb, Onion, Shalot, and Garlic.

For short prismatic crystals—Clover, Sanfoin, Beech, and Trefoil.

For true raphides—Squill Bulb, Hyacinth, Blue Bell, Lemna Trisulca, Balsams, Willow Herbs, Fuchsias, and Arums.

Cystoliths.—Leaves containing these should not be mounted in balsam or dammar, as they do not polarize, and are generally rendered quite invisible by this way of mounting.

No one need be afraid of not being able to procure specimens, for I believe the greater part of our plants contain crystals of one kind or other; they may be well and easily studied by mounting in Deane's medium after preparing and dyeing, they may also often be very well seen by simply bleaching, washing, and examining in water. And I may add that the crystals afford an abundance of beautiful materials for the microscope, and that the more they are studied the more they will be admired. Their taxonomic and physiological significance too, is an important subject for further research, concerning which, Professor Gulliver has given the results of extensive observations. He recommends boiling the plant tissues in a solution of caustic potash; this is an easy way of exposing some crystals and their cells, though by no means so effectual in the preparation of beautiful and instructive slides, as the methods which I have attempted to describe.

NOTES ON A DREDGING EXPEDITION.

BEFORE entering upon the subject of actual dredging, it would, perhaps, be as well to give a brief description of the little fishing-village which formed my head-quarters. Rossbeigh is a small watering-place on the east shore of Dingle Bay, in Kerry, Ireland. It is the property of the Hon. Rowland Winn, and consists of a few lodges, one of which, in the month of September last, I rented. About a mile away from these lodges are a few scattered fishermen's huts; and when the reader is informed that Rossbeigh is eight miles from the nearest town, and twenty from any railway station, he will understand that I had greatly to depend upon my own resources.

On looking at the map of this district, it will be noticed that there is a long spit of land running out towards a place called "Inch": this spit is over three miles in length, and is entirely composed of sand. From the signal-towers at the termination of this peninsula to a point called Feakleally, an imaginary line may be drawn, and within this no great depth of water can, I believe, be found, for the following reason: Rossbeigh is situated on a mountain-side, a mountain whose base terminates upon the seashore; the soil at its foot is largely composed of a conglomerate, containing a great quantity of rounded

stones, and formed, in all likelihood, by the continual detrition of the mountain-streams. This soil, being so friable, falls an easy prey to the eroding influence of water, the sea having made considerable inroads into the land; so much so, that a lodge which about thirty years ago was occupied by Lord Headley, is now entirely washed away; its site being utterly unrecognizable. Now the headland of Feakleally checks any currents running up from the Atlantic, while the sandhills at Rossbeigh are another break-water. Thus the bottom of the bay at this portion is shallow, and largely consists of the rounded boulders of the conglomerate. I have given this description in order to explain the kind of sea-bed I had to work upon. We will now proceed to the actual dredging.

The first requisite is of course the dredge and rope. The former of the two consists of a strong iron frame-

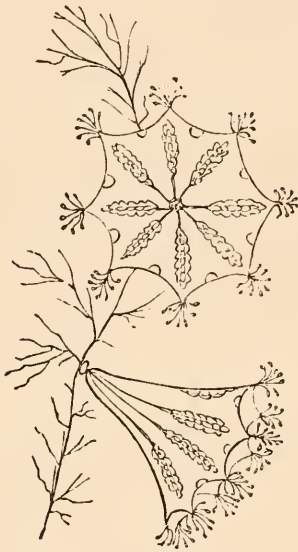


Fig. 97. *Lucernaria auricula*.

work (if galvanized the better); the scrapers are two in number, so that, no matter on which side the dredge may fall, it can work. The rope is made of good stout material, and ought to be "barked," which can be done in any tan-yard for a trifle. The rope is attached to the dredge in a somewhat peculiar manner; the end is tied securely to only one of the attachment rings, and with a piece of spun yarn the other ring is whipped to its fellow; so that, supposing the dredge to have anchored on a stone, and that it cannot be liberated by retracing ground, and thereby reversing the strain on the dredge, the boat is pulled rapidly until the spun yarn breaks; then the dredge, being capsized, is freed easily. The next item is the boat: the heavier this is, within reason, the better.

In this I was, at the outset, unfortunate, as at first I could only obtain one of the Irish native canvas

canoes, which, drawing but little water and keelless, would, on the smallest provocation, perform a rotatory motion, which would result in heading in a totally opposite direction to the one started from; however, Mr. Winn very kindly had a small whale-boat belonging to him repaired for me, which served my purpose excellently. Across the boat, resting on each gunwale, I had a board fixed, as a support for the tray which received the contents of the dredge. This little detail is a very useful one, as it not only saves the trouble of stooping to examine the spoil, but also prevents the giddiness which often attends that position, and which is very frequently the herald of sea-sickness. Three sieves, of varying meshes, are also very useful; one, a coarse mesh, of about half-inch diameter; the second moderate, about one eighth-inch; and the third of perforated zinc. Their use will be afterwards explained. Also a shallow box as a receptacle for the contents of the dredge, plenty of bottles, in which to store the

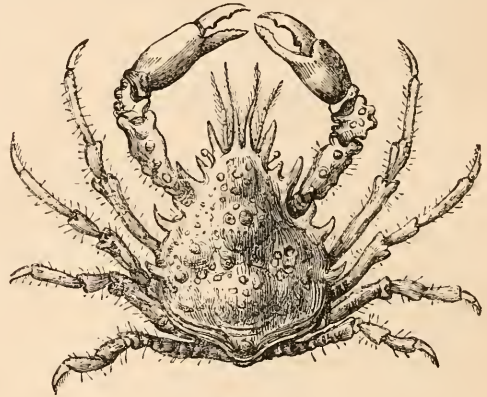


Fig. 98. *Pisa tetraodon*.

treasures, a gallon can of fresh water, a good strong pocket-knife, a brass forceps and a pocket-lens complete the equipment. The last I would recommend to be slung round the neck, so that it may be free, as it is neither an easy nor a clean task to be searching for it in the pocket with wet and often slimy hands. Now all being completed, dressed in your oldest clothes, and legs encased in mackintosh leggings, the boat is pulled out to the dredging-ground, and there the dredge is thrown overboard, near the stern, on the windward side, taking care that the rope runs freely. When it touches the bottom, the boat should be rapidly pulled until enough rope has been let out: roughly speaking, there should be twice as much rope out as the depth of the water dredged. When enough is paid out, a turn or two should be taken round a belaying-pin, and the inner end retained in one hand, while the other should clasp the part outside the boat, by which aid, the rope serving by its vibration as a kind of telephone, the working of the dredge

may be detected. If the dredge is jerking and bounding, the boat is being pulled too fast, whereas, on the other hand, too slow a progress causes the irons to sink too deeply; but when all is as it should be, the hand feels a gentle quivering, which proves the machine is working steadily. Do not, however, hold the rope too tightly, else, in the event of the dredge being suddenly anchored by a stone, you, in all probability, will collide rather unpleasantly with the side of the boat. Should the dredge get entangled, the best way to free it is to retrace ground, and, in most cases, it will free itself on being

place in the tray. The process of sifting is greatly facilitated by washing the top mass.

My first day's dredging off Rossbeigh was about a mile from shore. This attempt was made from a native canoe, and from the little hold the craft had upon the water, the dredge could scarcely be got to work. The only benefit that accrued to me from that day's work was a rough knowledge of the depth of the water and the nature of sea-bottom, which, unfortunately, largely consisted of heavy, rounded stones. The next day's work was undertaken at low tide. The course chosen was further out to sea; but

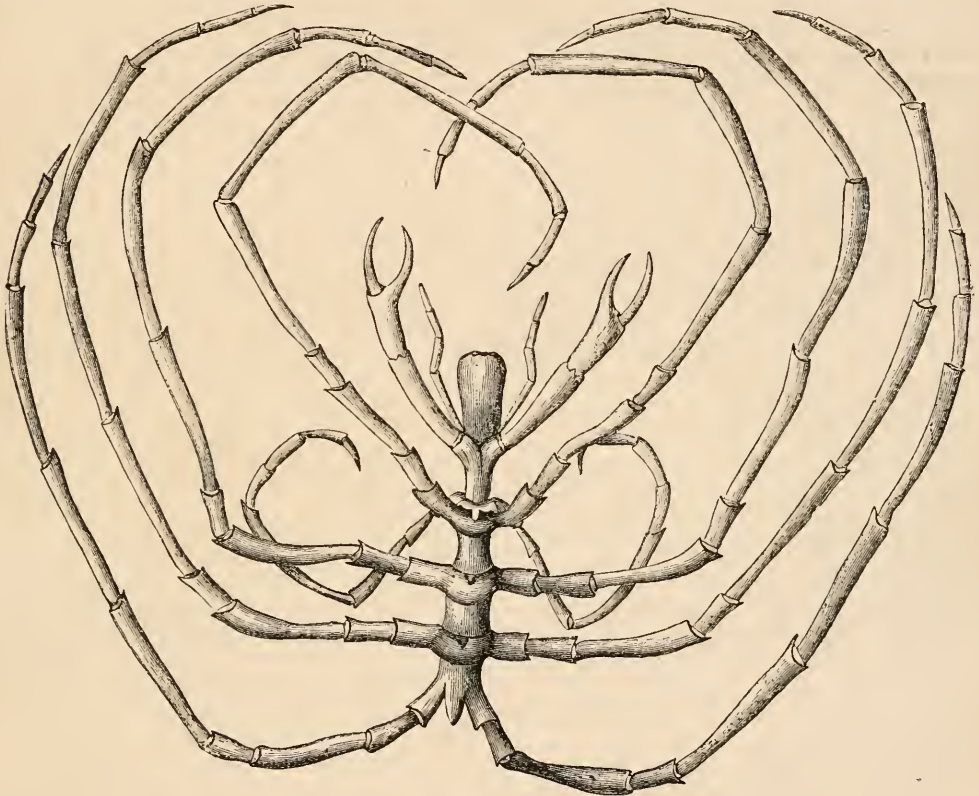


Fig. 99. *Nymphon gracilis*.

towed in an opposite direction; if that means fails, the rope must be strained until the spun yarn, already alluded to, breaks, when the dredge, being capsized, will easily free itself.

Supposing all to have gone on well, after half an hour the dredge may be lifted rapidly, but steadily, to the surface, taking care to lift it clear of the side of the boat, else you run the danger of crushing the crustacea and shells it may contain, and the contents emptied into sieve No. 1 (the coarsest). Large shells, stones, &c., are here retained, the smaller specimens successively passing into sieves Nos. 2 and 3, and finally the very minute forms find a resting-

even at this distance from land (about $1\frac{1}{2}$ mile from shore), where comparatively deep water might have been expected, the depth did not, I should judge, exceed 5 to 7 fathoms, the dredge coming up choked with *Rhodospirms* and other sea-weeds, mostly *Polysiphonia* and *Ptilota*. However, on emptying the dredge, a variety of marine animals were discovered, which, although not rare, were none the less curious. Two specimens of *Pisa tetraodon* rather obtrusively first made their appearance, and were followed soon by what very easily might have been mistaken for a lump of sea-weed, *Stenorhynchus phalangium*; several specimens of the Hermit Crab-

(*Pagurus Bernhardii*) were also inclosed. On more closely examining some of the sea-weed, I found several specimens of *Caprella linearis*, a most grotesque-looking animal, its movements very much resembling the walk of the looper caterpillar (Brimstone Moth), also a specimen of *Nymphon gracilis*, very few shells, and those very common ones.

On looking over the result the next day, I found a great quantity of foraminifera. I also found a few sponges and zoophytes: of the latter, *Laomedea geniculata* was the most common; also two specimens of *Lucernaria*, and, of course, any quantity of *Membranipora pilosa*.

The next day's work was undertaken in company with Dr. Battersby, who kindly gave me the benefit of his knowledge of this coast, of which he is a resident, and we judged it wiser to commence lower down the coast, off a small coast-guard station, called Kells; but although the water was considerably deeper and more sheltered, we found very little more to reward the trouble: a few shells, all dead and containing *Pagurus*, a dead specimen of the "shoulder of mutton" shell (*Aporrhais pes-pellicani*), and one living *Natica*. In the cavities of some of the roots of the Tangle (*Laminaria bulbosa*) brought up, a few specimens of *Patella pellucida* were found. We also obtained a few specimens of *Ophiocoma neglecta* and one of *O. rosula*; but on the whole, probably because of the sharp currents running along the coast, the conditions conducing to animal life were not very favourable.

Before concluding, perhaps a few words respecting the method of preserving specimens collected would not be out of place. The best methylated spirits of wine and ordinary sea-water mixed in the proportion of one part spirit to five water, is as good as any for the majority of forms. In first mixing, the spirit, owing to the resin in it, is apt to throw down a cloudy precipitate. This may be got rid of by adding to the mixture about an ounce of bicarbonate of soda to each quart, and filtering the whole through paper. Sea-weeds may be simply spread out and dried. If it be wished to get the shells of foraminifera from sand dredged up, a good plan is to dry the sand thoroughly in a moderately warm oven, and when perfectly free from moisture, allow them to cool, and gently place the whole in a vessel of water, when the sand will sink to the bottom, whilst the foraminifera, containing air in their chambers, will float. The now separated foraminifera may be easily selected under a lens by simply picking them out with a camel-hair brush, to which they will adhere, if it be drawn through the lips: they may be afterwards mounted dry or in balsam. Before throwing any of the dredge contents overboard, it is a wise plan to place the sea-weed, or at least the feathery forms, in fresh water, as unexpected discoveries are revealed by this means—minute forms, whose very existence was unsuspected, are compelled to declare themselves.

To briefly sum up, the dredger must have plenty of patience, must not mind wetting, evil smells, although on a sandy coast this is not very bad, and must trust as little as he possibly can to a boatman's assistance in sorting over his spoil, else half his treasures will be lost. A few good books for identifying his results are, I need not say, invaluable. The ones I have found very useful are Gosse's "Marine Zoology:" this will give the genera of the animal spoil, while "British Sea-weeds," by W. H. Harvey, will supply the botanical want. If, however, the latter is too expensive, there is a small shilling book by Mrs. Lane Clarke that is very useful. One, however, of the best general books, embracing a good deal, in fact, of nearly every class of sea plunder that the beginner is likely to come across, is "Half-hours at the Sea-side," by J. E. Taylor.

In conclusion, I can assure my readers that if any one of them care to devote his holiday to dredging, he will not only make a great acquisition to his marine knowledge, but also to his health; and I only wish that he may have as lovely surroundings in scenery as I had.

H. A. FRANCIS.

HOW TO MAKE AN HERBARIUM.

A CHAPTER FOR YOUNG COLLECTORS.

BY JOHN W. BUCK, B.Sc.

AS the summer advances doubtless many young lovers of nature will begin again gathering wild-flowers, and bringing them home in nosegays, as they have often done before, to be looked at for an hour or two and then, when withered, thrown away. Some may have tried ere this to dry them, and so to keep a record of their industry and their love for flowers, but may not have succeeded to their own satisfaction for want of a little help or instruction to begin with. It is for such that I intend this paper. To make an herbarium may sound a very imposing task, but such it need not be, for it can be done slowly and gradually—a plant at a time, if need be—and the flowers, when thoroughly dried and mounted, if taken care of will keep an indefinite time and be a lasting source of enjoyment. Nothing is so conducive to a knowledge of our British wild-flowers as to make as complete a collection as possible of them; although those who take my advice and make the attempt will probably be surprised to find how few flowers they already know, and how many there are hidden away under the hedges or in the woods which they never saw before. An object such as this gives a new zest to our country walks, besides making us find out new ones; gives us pleasant associations with particular spots as being the places where we first found such and such a new flower, fern, or moss; and above all gives us new and brightened views of nature and of nature's God.

To collect flowers for an herbarium, all that is necessary is a tin box and a trowel, though some collectors prefer to carry a portfolio containing porous paper and to put the plant under pressure on the spot. This has the advantage of securing that the flower shall lose none of its freshness while being carried home ; but it is a cumbrous and troublesome plan, and it will probably be found, in the case of most flowers, that if they are brought home in a biscuit-tin, and the roots perhaps placed in water to freshen them up if necessary before pressing, that they will appear as good as need be. It will nevertheless be found very convenient to carry a small pocket-book with some porous-paper leaves, in which to preserve at once some blossoms which will require it. For instance, it will be found impossible to bring home an entire Dandelion or Bindweed without the blossom closing up ; and the corolla of the Germander Speedwell, the bright little blue flower often called Bird's-eye or Cat's-eye, that looks so pretty and lasts so long in the summer hedgerows, will almost certainly be knocked off before the plant can be pressed at home. In such cases these parts must be put under pressure separately from the rest of the plant, and at once. Indeed, such a sleepy plant as the Tragopogon, or John-go-to-bed-at-noon, almost requires to be caught with guile. Go in the morning when it is open and press the blossom in the porous-paper book before detaching it from the stalk. Some entire plants, from their delicate and brittle nature, had better be pressed on the spot ; as, for instance, the pale-green Moschatel, the stalks of which are almost sure to snap with the slightest rough usage. Of course, when the roots have to be cleared from much earth, especially if the earth is of a clayey nature, it is absolutely necessary to bring the plant home before doing anything with it. On the whole, the tin box will be found preferable to the portfolio, and the occasions on which the latter must be used will soon be learnt by experience. Better than either, because more convenient, is the regulation vasculum, of japanned tin.

For digging up the plants, since in most cases the roots must be preserved, a trowel is generally recommended. After a few of these have been broken by rough usage in stiff soils, or spoilt by friends who have borrowed them "just for once," they will probably be replaced by a small three-pronged fork, about the same size as the trowel, but much more durable. Even this, however, has its disadvantage, which will be found out on trial. In selecting the specimens for preservation, a little discrimination should be exercised. It is best, perhaps, to take two plants of the same kind and dry both, and afterwards choose the best of the two for mounting. It is not advisable to take more, unless they are somewhat inaccessible, or unless, for other reasons, it should be difficult afterwards to obtain more if required, as a large number only fills up the box, takes up a great deal of room in the press, and gives much unnecessary trouble in

many ways. Choose, therefore, two plants which are fairly developed, and which show, if possible, specimens of all the kinds of leaves the plant may possess, which have some blossoms fully open and others in bud, and, in short, which are in all respects good specimens of their kind. In some cases the leaves are not up when the flower is open, as with the Yellow Coltsfoot, which flowers in the early spring, but whose leaves are not to be found until much later. It is a mistake to choose too large a plant, under the impression that it will look well ; a medium should be aimed at in this matter, as in everything else. Perhaps it is not unnecessary to say that rare plants ought not to be exterminated. Persons who go about hunting for rarities, and who take all they can lay their hands on, are collectors *only*, not botanists. Many of our uncommon ferns are daily becoming rarer, and harder to be found by those who really want to study them, because they are so diligently sought after and dug up by collectors who only want them to sell. My advice is, if you find a rarity, take of it in moderation, and then, in the interests of science, keep your own counsel as to its whereabouts.

In removing a plant, care must be taken not to spoil the root, nor to injure the leaves that spring from near the ground. It is often of great importance that these latter should be kept intact, as they frequently differ from the leaves which grow higher up the stem, and are very useful in assisting to determine the name of the species. With many plants, as is the case with the Coltsfoot, the root will be almost sure to break off sooner or later. Again, a complete Blue-bell, bulb and all entire, will be a very good certificate of perseverance for its possessor. The adhering earth should be shaken off as far as possible without doing injury to the roots, and the rest carefully pulled off at home, or removed by holding the root (only) under a stream of water.

The next thing ought to be to name the specimen ; and if I could take for granted a little knowledge of botany on the part of my readers, it would not be very difficult to show in brief the easiest method of arriving at the correct botanical and popular names of most of our common wild-flowers. For those, however, who know nothing of botany, the best way is to compare the flowers brought home with the illustrations in some such work as Ann Pratt's "Wild-Flowers," or John's "Flowers of the Field," or Sowerby's "English Botany," or to obtain the help of some botanical friend. At all events, you need not despair of making good progress with your herbarium, even if you do not know the names of all the plants it contains, as these can generally be added afterwards.

In any case, proceed to dry your plants before they lose their freshness. This is accomplished by pressing them between porous paper. The best paper for the purpose is, or used to be, made by

Messrs. Spicer, of New Bridge-street, Blackfriars (who also supply white paper for mounting, in sheets about 17 in. by 11 in.), but in default of this, thick blotting-paper is said to answer, though I have not tried it. The plants must not be damp when they are put in the press, and if the roots have been washed to clean them, they should be wiped as dry as possible. If for any reason the plants are at all damp, the papers should be changed very frequently at first, even twice a day, until the excess of moisture has been removed. I am frequently asked, "How is it you manage to keep the colours of your flowers so well?" Mainly by attention to this point—by not allowing the flowers to remain damp. Otherwise they are very apt to change their colour; as, for example, the Wood Anemone, or Windflower, which generally turns brown, but which may be kept white with proper care. Heaths and firs are said to require a dip in boiling water before drying, in order to prevent the foliage from falling off. The same process prevents succulents, such as the curious flesh-coloured parasitic Toothwort, from growing during or after pressure, by killing them at once. Here, also, the superfluous moisture should be removed by a handkerchief before pressing. Do not mix fresh specimens with dry ones, but separate them with several sheets of brown paper. Laying the plants out will often be found a troublesome process, and one which, in order to do it well, will in some cases require time and patience, but it is not of much use to give advice on this head, except to say that the various parts of the flower should be as well exhibited as possible. For instance, where the flower has a coloured calyx and no corolla, as in Marsh Marigold, Clematis, and Wood Anemone, one blossom should be folded up so as to show the absence of the customary row of green leaves below the coloured ones. Or the same subject may be effected by completely reversing one blossom, so that its face is towards the paper. Where bracts, or small leaflets at the base of the flower-stalks occur, as in orchids, they should be shown. The specimens should be distributed among the sheets of porous paper in such a way that the pressure may be somewhat equal in all places; but those plants, however, are likely to dry more quickly which are nearer the margin of the sheets. Thick stems had better be sliced in half longitudinally, as it prevents their taking up too much room, and also enables them to dry very much faster. The same course may be taken with thick roots or root-stocks, as in Primrose and Coltsfoot; but in such cases care must be taken to leave enough root-fibres adhering to the main axis. Bulbs and corms, and the fleshy tuberous roots of orchids may also be sliced; some recommend scooping out the inside, but this is apt to make them break and spoil under pressure. Berries and stems that are not thick enough to slice may be repeatedly pricked on their under surface, or slashed with the point of a penknife, to let out the moisture. A very good plan

with fleshy berries, and thick stems and roots, is to dry them, apart from the rest of the plant, by pressing them between several folds of porous paper, and baking the whole for three-quarters of an hour in an oven. But this does not always answer, and should not be tried with green leaves, as it is apt to turn them brown. In short, the more rapid the drying process the better; and hence the necessity of having recourse to these contrivances in order that the colours of the blossoms may not be injured through being kept damp by the slow drying of the thicker parts.

(To be continued.)

MICROSCOPY.

"CUTTING IT FINE."—At the usual conversazione which followed the ordinary meeting of the Quekett Microscopical Club on April 26th, Mr. E. T. Newton exhibited thirty-three sections of the head of *one* cockroach!—*Blatta Orientalis*.

FOSSIL DIATOMACEÆ.—The Diatomaceæ in the Cementstein are described and figured (very beautifully) by Dr. Heiberg, in his "Kritisoversigt over de Danske Diatomeer." The richest in diatoms is the Cementstein from the island of Mors, situated in the Liimfjord, lat. 56° 50' N., long. 8° 40' W. This fjord is the largest in Jutland, and runs from east to west, connecting the North Sea with the Kattegat. The material is also known as "Jutland slate." A similar deposit occurs in Fuur; it is less affected by acid, and bears considerable resemblance to the deposit known as "Brown coal." Another deposit is found at Nykjøbing, a village on the western side of the island of Mors. This is much more difficult to prepare, neither acid nor alkali making much impression upon it. The following forms have been described and figured by Dr. Heiberg in his treatise, and by myself in the "Journal of the Quekett Microscopical Club," in the Parts for 1870 and 1871. The following are the most abundant forms in the Mors deposit:—*Trinacria regina*, Heiberg; *T. excavata* = *Triceratium solenoceros*, Ehr = *T. Kittonianum*, Greville; *Trinacria Heibergia*, Kitton; *Do. var.*, Kitton; *Triceratium maculatum*, Kitton; *Solium excelsum*, Heiberg; *Coriuna elegans*, Heiberg; *Stictodiscus angulatus*, Grunow; *Stephanogonia Danica*, Grunow; *Trochoseira mirabilis*, Kitton; *T. spinosa*, Kitton; *Hemiaulus proteus*, Heiberg; *H. hostilis*, Heiberg; *H. februtus*, Heiberg; *Do.* (q. sp.), Kitton; *Cocinodiscus stellatus*, Roper; *C. radiatus*, Ehr; *C. oculus Iridis*, Ehr; *Stephanopyxis* (qu. sp.); *Aulacodiscus Futilandicus*, Kitton. Triceratia occur in the Barbadoes, Californian, and Morsa deposits, as well as in the Virginian "carths."—*F. Kitton, Norwich*.

AQUARIA FOR MICROSCOPIC WORK.—In answer to W. D. B., I would suggest that I find several small aquaria (none of them holding more than a quart)

much better for microscopic work than a large one, for we can hold one up to the light with one hand and use the dipping-tube with the other. We are able to keep a better and more varied assortment, and the depth is better for dipping. Anatomical specimen-jars and beakers I find to be most convenient, but wide-mouthed bottles may be substituted on account of cheapness. I have usually about thirty in use, some of them being very small, and I never find it necessary to change the water. Covers of muslin, cardboard, paper, or glass can be used. Among the plants I find to be useful are *Elodea canadensis*, species of *Chara*, *Callitriche verna*, *Scapania undulata*, *Pilularia globulifera*, *Montia fontana*, and species of bog and water *Hypna*.—*Wm. West, Bradford.*

SMALL AQUARIUM FOR MICROSCOPIC OBJECTS.—It is likely that W. D. B. may have some difficulty in finding his animalculæ, &c., if he should put them into a tank of thirty inches length and proportionate depth and breadth. I recommend him to make much smaller ones upon the following plan:—buy at the grocers some of the empty tin boxes which have held between two and three pounds of Huntley & Palmer's Water Biscuits (mind, *Water*), cut out the ends and sides, leaving a framework sufficient to support the glass, and you have at once the skeleton of a handy and well-proportioned tank. Cement the glass with a mixture of red and white lead, let it set for two or three days, then fill the tank with water and let it remain for a week, so that the taint of the lead may be removed; empty out, put a layer of well-washed Calais sand at the bottom, and the tank is ready. Mount it upon a slab of wood, and put four slips of thin wood to retain it in position. The tin frame should have two coats of paint or Brunswick black. I prefer the latter.—*A. P. W.*

CANADA BALSAM IN INDIA.—Will slides mounted in balsam stand the heat of India? Would it be sufficient to surround the cover with some heat-resisting cement? If balsam will not do, what other medium will?—*H. F. Blackett.*

THE HACKNEY MICROSCOPICAL SOCIETY.—This society, which specially devotes itself to the study of microscopy and natural history, has just issued its first annual report. We are glad to see abundant signs of vigorous health, although the society is only a year old. The president is Mr. H. Ramsden, M.A., F.L.S.; and the hon. secretary, Mr. Collis Willmott. The list of members is numerous, and includes many names well known in science. Papers on various natural history subjects, chiefly entomological, have been read, and five field excursions made during the summer. The foundation of a good natural history library has also been laid, and with such a start we shall look forward with interest to the progress of the society during its second year.

ZOOLOGY.

THE URANIIDÆ.—At a recent meeting of the Zoological Society, Professor Westwood communicated a memoir on the *Uraniidæ*, a family of Lepidopterous insects, with a synopsis of the family, and a monograph of one of the genera, *Coronidia*. These insects were remarkable for their extreme beauty, and the difficulty which had attended their systematic classification. Their relations with other groups of Lepidopterous insects were discussed at considerable length, and their numerous affinities were shown to be with certain other moths belonging to the great division of the Bombyces, whilst their connection with the Hesperian butterflies, the Pseudo-sphinges, Erebidæ, Noctæ and Ourapterygeous Geometræ was disproved by their general structure, the venation of their wings, and their transformations. A synopsis of the species of all the genera was given, and a complete monograph with figures of the genus *Coronidia*.

THE BRACHIOPODA OF THE ATLANTIC.—At the same meeting Mr. Gwyn Jeffreys, F.R.S., F.Z.S., read a paper on the above subject. The areas from which the Brachiopoda were obtained were restricted to portions of the North Atlantic, including the Mediterranean. A table of all the Brachiopods known to inhabit the European seas was given, comprising ten genera and twenty-two species, of which latter four were for the first time described, and six figured. The table also particularized the geological and bathymetrical range of all the species. Two plates accompanied the paper, and were furnished by Mr. Davidson.

MIMICRY IN BIRDS.—Mr. J. Young writes to *Nature* to say that in a tract of land on the coast of Kent called Reculver Marsh, the place is much frequented by skylarks and plovers, and that almost all the larks have incorporated the well-known alarm-note of the plover into their song. Professor Newton remarks that this fact has already attracted notice; for at Thetford, in Norfolk, where the ringed plover is common, skylarks often mimic its peculiar cry. Starlings are said to have acquired the cries of various kinds of birds, notably those of the plover and swallow. Jays are also stated to imitate the note of the carrion-crow.

THE NIGHTINGALE IN DERBYSHIRE.—Pray let me note to you, and through SCIENCE-GOSSIP to others, the pleasing fact that a nightingale has made its appearance here, and has been nightly for the past week (and is still) singing its sweet song close to this village. It is but seldom that the nightingale visits Derbyshire at all, and this is the first time, so far as my knowledge goes, of its ever having come so far north in our county as Winster, which, as you are aware, is in the Peak district. It will be well, with your permission, to make known this visit through SCIENCE-GOSSIP.—*Llewellynn Jewitt, F.S.A., &c.*

DEVELOPMENT OF *PROTEUS ANGUINUS*.—Professor Schulze has recently discovered the mode of development of this blind amphibian. He found a specimen in the Adelsberg cave which had laid fifty-six eggs. The *Proteus* is proved, by researches on the ovary of a female from which the eggs were taken, to be oviparous.

THE CUMBERLAND ASSOCIATION FOR THE ADVANCEMENT OF LITERATURE AND SCIENCE.—A capital plan is in successful action in Cumberland, whereby scientific societies in six of the chief towns are affiliated into the above association. The annual gathering was held in Cockermouth in Easter week; when Mr. Isaac Fletcher, M.P., gave the presidential address. Afterwards, Sir George Airy, the Astronomer-Royal, delivered what he said would most probably be his *last* lecture, on "The Interior of the Earth." Mr. J. Clifton Ward, F.G.S., the hon. secretary, read a valuable paper on "Quartz in the Lake District." Various other papers were read.

THE NORTHAMPTON NATURAL HISTORY SOCIETY have issued their second report, which shows a numerical increase in members, and a uniform success in all their efforts. The meetings have been held monthly, at all of which papers have been read. A list of the Lepidoptera of the county is being prepared by the President of the Entomological Section, Mr. A. Perry. The President of the Society is the Right Hon. Lord Lilford, and the Hon. Sec. Mr. G. C. Druce.

EARLY APPEARANCE OF *COLIAS EDUSA*.—Mr. W. H. Liversedge saw three specimens of *Colias edusa*, on Monday, April 22, while driving near Ryde, Isle of Wight. They were strong on the wing, as if freshly emerged, or they may have hibernated in the imago.

NEW BRITISH CRUSTACEA.—Mr. Spence Bate has described two new species of small Crustacea, found by Mr. Sims of Aberdeen. One species belongs to the *Diastylidae*, and the other to the *Amphipoda*. The former has been named *Diastylis bimarginatus*, and the latter *Lestrigonus spinidorsalis*.

SALMON DISEASE.—Mr. Worthington Smith describes and figures the disease which this spring has destroyed such numbers of salmon in the Eden and other rivers. It is the result of the growth of a fungus, *Saprolegnia ferax*, in enormous quantities; and Mr. Smith thinks the unusually vigorous growth may be due to the mildness of the past winter.

BOTANY.

SUMMER LADY'S TRESSES (*Spiranthes aestivalis*).—I am quite sure all botanists will deeply regret to learn that this rare plant—which, like *Gladiolus illyricus* and *Pulmonaria angustifolia*, is to be seen

nowhere in England but in the New Forest—is being rapidly cleared out of its station near the Lyndhurst and Christchurch Road. I have reason to fear that in two years not a single specimen will be found in the famous Spiranthes bog. This is deplorable—and I must explain how this much-to-be-deprecated eradication is being effected. The year before last a second edition of the "New Forest Handbook" was brought out, comprising, among other additions, a short paper on the botany of the district, and in this the author thought fit to describe, with almost painful minuteness, the exact locality of the bog. This, no doubt, was kindly meant, but the consequences are lamentable, as I shall presently show. In the vicinity of Lyndhurst, and in many other parts of the Forest, there are resident "collectors," who collect insects (chiefly *Lepidoptera*), birds' eggs, rare ferns, and anything else which is marketable, and dispose of them either to London dealers or to visitors. Now, when the handbook appeared containing the notice of *Spiranthes aestivalis*, and referring to it as "a plant quite peculiar to the New Forest, and to be found in no other spot in England," they saw at once a rare opportunity for increasing their returns; since, by carefully pulling up every plant they could find, they would hold the monopoly, and always be sure of a ready and certain sale. This was made more apparent when large numbers of visitors flocked to the bog last year, even as early as May, and when orders for specimens came in from all parts of the kingdom. Their anxiety to discover the plant as early as possible was very great, and on more than one occasion I have been asked what it looked like, and how they might know it, for a plant a few inches high, with a lax spike of small white flowers, growing in a very wet sphagnum bog, is not very likely to attract much attention. In the month of August I called at one of the cottages close by and inquired about the *Spiranthes*. I was told that the day previously it had been found by a visitor. "So," continued my informant, "as we have so many people asking about them, and so many orders, we went out last night and this morning and brought in every plant that was in blossom. I'll show you them," and—shall I say it?—to my intense disgust a large earthenware pan, about two feet in diameter, was brought out *completely filled with* *Spiranthes aestivalis*—roots, flowers, and all! Besides this there was on the table a good handful of cut blossoms. I said I would walk over the bog and see if there were any more, which called forth the remark: "I don't think it's of any use, Sir; I don't think there's one left." However, I searched, and after wading half-knee-deep in water for an hour or so, succeeded in finding three specimens, two of which I took, and afterwards reproached myself for leaving the third; for I felt sure it would be gone next day. I have not visited the cottage since, but I have no doubt that every visible specimen was ruthlessly

pulled up. The only chance was for young plants which did not blossom—these of course are bound to go this year; next year the last lingering vestiges will be swept away, and *Spiranthes aestivalis* shall never again flourish at its celebrated station in the New Forest of Hampshire. Nothing can save it. Other bogs will, when this one is exhausted, be searched, and if, as is said, the *Spiranthes* occurs elsewhere in the neighbourhood, it will soon be a thing of the past, and one of the very rarest plants in the United Kingdom will be extinct, unless specimens are procured from the Channel Islands and planted. Can anything be done to prevent its complete extirpation? I do not for a moment blame the cottagers; if a wild plant will fetch a given number of shillings in the market, these people have, undoubtedly, as great a right to sell them as have more wealthy collectors to travel a long distance in order to gather them for themselves. The plants do not belong to anybody in particular, and the cottagers may as well make money out of them as by the sale of a *Vanessa antiopa*, a Montagu's Harrier, or a nest of raven's or honey-buzzard's eggs. The error lies in making the habitat of a rare plant publicly known. When will kind-hearted botanists learn that it is a grand mistake to publish the exact habitat of a rare or local species? It is disheartening enough to know that a plant is gradually becoming more and more scarce in a district, yet it is some consolation to know that it grows in other parts; but what must be the feeling of all right-minded botanists on learning that the only spot in the kingdom in which a species flourishes is being rapidly and surely shorn of its glory? *Spiranthes aestivalis*, compared with other orchids, has but small pretensions to beauty, and is far from being a conspicuous plant; and growing in the very wettest part of a peat bog, might have escaped destruction, and continued to flourish for many long years to come. The (perhaps) well-intentioned, but most injudicious, publication of half-a-dozen lines will, in all probability, be the means of extirpating it, and robbing the British flora of one of its brightest gems.—*E. D. Marquand, Brockenhurst.*

OROBANCHE ON BEGONIA.—We have in our greenhouse an *Orobanche* that has arisen from the roots of a Begonia. In the field close to the house every year we have many *Orobanche minor*, arising, we presume, from the roots of clover. We therefore thought that it might be this plant, but from the description, which I send you, you will see it is not. Sepal with no vein, or if with one vein, very indistinct; ovate below, narrowed into one subulate point shorter than the tube of the corolla; corolla tubular arcuate; lips denticulate, wavy; lobes of the lower lip nearly equal, middle one largest; upper lip emarginate, sides patent. Stamens inserted near to the base of the corolla tube, slightly pilose, anthers dark brown. Stigma approximately two-lobed, pale red. Bract

one. Leaves none. Stem purplish, four inches high.—*T. J. Edwards.*

LOOK AT THE HEDGEROWS DURING JUNE.—Mr. Hobkirk some few years since, in the pages of the "Naturalist," gave us an admirable article on the sub-species of the Hawthorn; until then they appeared to be overlooked by British botanists, or they merely regarded them as a single species. For several years they have furnished us matter for thought and study, so that now we can generally when riding rapidly along the lanes point out any of the species, or varieties, when in flower. What we particularly wish, in fact our object in drawing the attention of our readers to them, is to ascertain their distribution. For the present, and as the space at our command must be limited, we describe only two of the species, probably both will be discovered in many counties:—
1. *Cratægus oxyacanthoides*, *Thunb.*, may be recognised with ease, by having from two to three carpels, and the peduncles and calyx tube being glabrous or smooth.—2. *Cratægus monogyna*, *Jacq.* Carpel solitary, peduncles and calyx pubescent (clothed with fine down). The leaves are large, and deeply lobed. *No. 2* is our common species in the North of England, *No. 1* more rare.—*F.*

FERTILIZATION OF Mergenia Erecta.—At a recent meeting of the Linnæan Society, Mr. R. I. Lynch read a paper on the mechanism for the fertilization of the above plant. It is a West African Acanthaceous shrub, bearing funnel-shaped corollas, with hairy anthers midway in the tube, their backs pressed against the wall. The lower slender flexible style has its double-lipped stigma so formed and placed, that insects alighting and entering towards the nectar at the bottom of the flower, on their return so move the lever-lip of the stigma as to produce pollenization.

POSITION OF THE PASQUE FLOWER.—I have noticed that whenever I have found the *Anemone Pulsatilla* it has always grown in belts of a certain altitude, as for instance: last year on the Blewberry Downs I found the above specimen; it was growing in a belt at about 40 feet elevation, and the belt only being about 25 or 30 feet broad. I was rather surprised at this, and determined to take notice this year; I have done so, and again noticed the same peculiarity. I have never found *one* out of the belt. I have consulted many Botanics, but have seen no record of so marked a peculiarity in this specimen. The question is whether this is a universal fact or only a partial one, occurring only in the localities in which I have found the Pasque Flower.—*Albert Henry Barrett.*

EXPERIMENT WITH MISTLETOE BERRIES.—Having just been making an experiment with the above, I thought it probable that some of the

readers of SCIENCE-GOSSIP might be interested therewith. About a fortnight after Christmas I took some mistletoe berries, which had already done duty as decorations during the festive season, and squeezing each one separately, applied it to a branch or twig of a little hawthorn hedge. This hedge is now about three years old and is in vigorous growth. I applied, altogether, about two dozen seeds, without opening any of the bark at all, and left them to maintain their position by means of the viscous matter surrounding them. For a long time I could observe no outward difference on them, with the exception that they seemed to be swelling, so I had hope that life was present. About this period I one day observed that two or three of them had been pecked out by the birds. However, as I did not notice any more marauding behaviour of this kind, I am hopeful that a considerable percentage of the seed thus sown may grow. The next step in the way of progress—the seeds in addition to having become considerably swollen became of a bright green colour, and on several of the finest I could distinctly make out the lobed character which the cotyledons still wrapped together are beginning to assume. Last week, as I was making one of my daily inspections, I became aware of several of the little seeds having effected a junction with the branches they are attached to. Since then I have observed more of them, and I am congratulating myself that my venture will succeed. As the hedge is now fast becoming green it daily becomes a more difficult matter to find out the whereabouts of my friends. I must now wait to the end of the year, when the Hawthorn puts on its winter garb, before I shall be able to count how many have “taken.” As Devonshire is famous for producing very little of the mystic parasite, I have had the more pleasure in my pursuit, and hope that the “Mistletoe Bough” may become a permanent denizen of my hedge.—*J. Mills Higgins, Silvertown, Devon.*

GEOLOGY.

GOLD IN NEW GUINEA.—The discovery of gold in this hitherto unknown country promises, ere long, to make us better acquainted with its natural history and mineral productions. Expeditions are being fitted out, both in Australia and New Zealand, for the exploration of the interior, and the collection of general trustworthy information.

ANCIENT VEGETATION.—Professor Clappole has found the remains of Lepidodendron-like plants in the Clinton limestones of Ohio, belonging to the Upper Silurian period. The provisional name of *Glyptodendron* has been given to this, the oldest known American plant. As representing arborescent vegetation, it may be regarded as the oldest known specimen in the world.

FOSSIL INSECTS.—Mr. Scudder is preparing a work on the fossil insects of America. He has recently spent a couple of months in the Western Territories, collecting fossil insects. Six to seven thousand specimens were obtained from Florissant; all being remarkable for their beautiful preservation. There is every reason to believe that the tertiary strata of the Rocky Mountains are richer in the remains of fossil insects than any other part of the world. Mr. Scudder possesses more than twelve thousand specimens.

FOSSIL FRESH-WATER SPONGES.—Mr. J. T. Young, F.G.S., announces the discovery of spiculæ of fresh-water sponges in the so-called “flints” found in the Purbeck limestones. The spicules are like those of *Spongilla fluviatilis*, only larger. This is the first discovery of fossil fresh-water sponges in Great Britain. Mr. Young has called his specimen *Spongilla Purbeckensis*.

NOTES AND QUERIES.

IRISH WOLF-DOGS.—Will any one kindly inform me if the above dogs are extinct; if not, to whom they belong?—*L. M.*

HOW TO MAKE PLASTER CASTS OF FISH, &c.—I have read with much interest your article in SCIENCE-GOSSIP on the making of “Plaster Casts of Fishes.” Being a user of plaster in my occupation as a dentist, I venture to give you a better plan of managing that material. The process of mixing water with plaster should be as follows:—Put water first into the mixing vessel, and then add the plaster to it by shaking it from a scoop as evenly as you can into all parts of the water (in large quantities through a sieve), until the dry plaster floats on the surface; stir it slowly a little; then you have the proper quantity to make it of the consistence of cream, which is also the proper consistence to use for casting; then shake or jar the vessel a little, and let it stand for a few seconds to get rid of air-bubbles. The plaster, in this state, will give plenty of time to mix more and add if necessary. You may use any quality; but I should prefer “superfine,” 9s. per cwt. Trusting this will facilitate your interesting work.—*E. R. Pearce.*

A PLAGUE OF FLIES.—A small district, lying in the counties of Antrim and Derry, has this spring been afflicted with a plague of flies, entailing both inconvenience and loss to the inhabitants. The area affected was the river Bann, for about a mile and a half of its course, near Kilrea, and the pastures adjoining. The stones and plants in the river were completely encrusted with the pupa-cases of the insects, from which they issued in millions and attacked both men and cattle. The latter had to be removed from the vicinity, and many of the people had their heads and necks much swollen, owing to the venomous nature of the sting with which the insect was armed. The flies lived only for a few days, and left their dead carcasses heaped up on the river banks, in some places three inches deep; they have now (1st May) almost disappeared. Some of those supposed to be wise in such matters think that these flies have had their origin in the battle-fields of Turkey; others that their advent is a portent of omin-

ous coming disasters. I enclose specimens of the flies, and also of the pupa-cases: I presume they belong to the *Tabanidae*, or horse-flies; but why have they appeared in such force, and taken possession of the limited area referred to, where they had not attracted attention previously?—*S. A. Stewart, North-street, Belfast.*

REMOVING SURPLUS BALSAM.—Allow me to call the attention of those microscopists who mount their own objects, to a most useful and effective implement for removing surplus balsam. It is the invention of Mr. Carey, of Norwood, and can be seen, by his permission, at Mr. Baker's, 244, High Holborn. I call it "The Carey Scraper." In using it, heat according to the hardness of the balsam, and run the scraper round the edge of the covering-glass, wiping off the removed balsam on a piece of paper. It comes off freely, and leaves but very little on the slide to be finished off by benzole or other spirit.—*John Bramhall.*

NATTERJACK TOAD ON THE SHORES OF THE SOLWAY FIRTH (p. 67).—Sir William Jardine mentions the Natterjack as occurring "in a marsh on the coast of the Solway Firth, almost brackish, and within a hundred yards of spring-tide high-water mark. It lies between the village of Carse and Sotherness Point, where I have found them for six or seven miles along the coast. They are very abundant." The late Mr. Edward Newman also, in an article on the Natterjack published in the "Zoologist" for June, 1869, writes:—"In Scotland it has been found abundant on the coasts of the Solway Firth."—*W. R. Tate, Blandford.*

THE NATTERJACK TOAD IN CUMBERLAND.—I have for several years known of the existence of this toad on the shores of the Solway, at Silloth, a few miles from the locality noticed by your correspondent, Mr. Duckworth. I have from time to time obtained specimens by digging them out of the sand, where they hide during the day. They are found in burrows, sometimes a foot or more deep, opening usually at the top of a "scree" of sand, just beneath the overhanging turf. I have found from one to three toads in each hole. Last June I found that they frequented a pond near the railway station by hundreds. Their croaking, which was intermittent, beginning suddenly and ceasing as abruptly after two or three minutes, could be heard on a still evening more than 500 yards away. This toad, like the common one, has the chameleon-like property of being able to adapt its colour to surrounding circumstances. Those found in the sand were of a beautiful light grey, almost without any spots. Those found amid the moss and slime of the pond had large blotches of greenish yellow, not at all improving to their appearance.—*T. Lattimer.*

WOOD-PIGEONS' NESTS.—I was much interested a few days ago, in seeing a pair of wood-pigeons that are building a nest in a tree, in a garden a few feet from the backs of houses and a public road, and not many hundred yards from a large railway station and a busy thoroughfare, with tram-cars and omnibuses to the City and West End. Is it not curious that birds, so associated in our minds with peaceful country scenes, should choose a spot so very near the great desert of bricks and mortar? If the poor birds are unmolested and hatch their young, what long distances they must travel to procure food enough for them.—*H. Budge.*

THE WHITETHROAT A MIMIC.—A curious incident occurred to my observation on Saturday

afternoon, 4th May. While walking across a meadow I heard, proceeding from the hedge on the far side, a variety of guttural sounds, in which I recognised the song of the whitethroat (*Curruca cinerea*), but it was strangely interrupted by the alarm notes of the common swallow, sparrow, green and grey linnets, greater and lesser tits, and possibly a few others which I did not recognise. At first I was convinced that the several species were present. I drove the whitethroat out of the hedge, upon which he proceeded to a neighbouring one, and there resumed his imitations. Being anxious to make sure of this, I lay down near the hedge where I formerly heard him. In a short time he returned to it, and I had a favourable opportunity of seeing him. I watched him long enough to convince myself that every note proceeded from the same species. This peculiar characteristic of this bird I do not find mentioned in any books on ornithology which I have read.—*John D. Osborne, Carrickfergus, Co. Antrim.*

THE BOTANY OF THE CHANNEL ISLANDS.—In reply to your correspondent's first query under above heading.—Living in the Islands is not expensive. To his second:—At a farmhouse, or private lodgings, by all means. If J. Camber will send me his address I shall no doubt be able to give him all the information he requires.—*J. Sinel, Bagot, Jersey.*

AQUARIUM FOR MICROSCOPIC WORK.—I use leech vases about eight inches in diameter, which I get from the chemist for three and sixpence each. I think W. D. B. would find two or three such vases better than a larger aquarium. Among several other advantages specimens can be kept separate, and the bottom of the vase reached with the dipping tube.—*Richard B. Croft.*

R. FICARIEFORMIS.—If some correspondent would kindly give the specific characteristics of this plant in SCIENCE-GOSSIP, it would facilitate search for it in the South of England.—*F. H. A.*

PAIRING OF BIRDS.—I deny altogether that we have any proof that fowls have the slightest regard for the best fighting cock, or for the superior beauty of one male over another. Such ideas are totally opposed to science and to truth.—*C. R. Bree, M.D.*

COLIAS EDUSA AND ITS VARIETIES.—The great abundance of this graceful butterfly during the past season has offered to entomologists more opportunities of studying its nature and habits than they have had for several years. The question naturally arises:—to what cause are we to impute the strange appearance in such numbers of this once-prized insect? Many are the theories that have been brought forward to account for it, but the solution of this entomological problem seems as far off as ever. Although the investigation of it has been carried on for many years, we have no explanation of this phenomenon that we can receive with any particular amount of credit. The suggestion that the insect we find here has crossed the Channel, tempted by the fineness and heat of an English summer, certainly cannot be put forward as an argument in the case of last year. But to dilate upon, or even to mention, the numerous theories that have been brought forward to account for this would occupy more time and space than I have at my disposal. Another fact may be mentioned, namely, that the number of males taken was very nearly double that of the females. The difference in the appearance of these is much greater than one at first sight would suppose. The most striking

distinction is that the male has each of its wings edged with a black border, unbroken except by very fine yellow lines that are a continuation of the veins. In the female this border is broken by greenish-yellow patches, varying in size in different specimens. Besides this there is another less striking difference, namely, that at the root of each hind wing in the male there is a light yellow spot, of which there is no trace in the female. In the SCIENCE-GOSSIP for last December one of your correspondents remarks that he noticed in a specimen of this butterfly that the hind wings were suffused with a rosy purple lustre. If he will carefully examine his specimens, he will find this apparent peculiarity is common in a greater or less degree to every specimen of the male insect. Those male butterflies that had very lately emerged from the chrysalis would display it most vividly, while in the female there is not the least trace of it.—*C. E. B. Hewitt, Birmingham.*

PRESERVING SKINS.—Skins of small birds may be preserved by dipping wool in carbolic acid, and stuffing the birds with the same.—*J. Y.*

THE MIGHTY DEEP.—In your issue for April, I find a very interesting paper on this subject from Mr. A. Ramsay. Will you permit me to offer to him, and to your readers, a brief remark upon it? Mr. Ramsay says—"The great bulk of the sea is concentrated in the Southern hemisphere"—and on the authority of several authors he gives the most probable mean depth at about 2,600 fathoms. In the reports from the Challenger, as published by the Admiralty, Nos. 1, 2, 3, 6, and 7, the mean depth of 446 soundings is about 1,716 fathoms 4 feet 1 inch. I have, put down in the Geographical Magazine for March, page 66, the mean depth of the Northern hemisphere at about 1,907, and of the Southern at 1,642 fathoms; giving a mean depth all round the world of 1,774 fathoms 3 feet. The two means do not coincide, because I omitted certain coast soundings in the latter calculations. It follows, that the volume, as given by Mr. Ramsay, must be wrong; and though the surface-water area is more extensive in the South, the *bulk* of water is about the same in both hemispheres. The deepest water in the North is 4,575, in the South 2,900 fathoms; in the Arctic regions 1,860, in the Antarctic 1,800. There is water round the North Pole, and land round the South. The equilibrium of the globe seems perfect. The mean depth of the ocean, beyond coast soundings, may be put down at 1,750 fathoms; very nearly two miles. If Mr. A. Ramsay can turn his attention to the Geological Survey report of the Winter Mountains, as published at Washington, U.S., he will find some curious facts as to the depth of water in those regions in times long past.—*H. P. Malet.*

THE NATTERJACK TOAD.—Can you tell me if it is true that the Natterjack toad (*Bufo calamita*) gives forth a most intolerable odour when handled or frightened? I should be much obliged, too, if you could inform me of any place near London where this reptile may be met with.—*J. Perrycap.*

OUR BRITISH SNAKES.—In answer to a question put in the February number of the SCIENCE-GOSSIP as to whether our British snakes eat birds or mice, I can state positively that the viper eats both. In 1876 I killed a viper, which I found to contain six young willow wrens, feathered, and within a few days of flying. Last year I killed a young one, which contained a large long-tailed field mouse. Can any of your readers give me any information as to how

or why the blind-worm carries its young in a case, in its back, and how long this continues? and do either the viper or ringed snake do the same?

REMARKABLE NESTS.—This year we have noticed three curious instances of a departure from the usual habits of birds in building their nests, which seem worth recording. The song-thrush lines her nest with cow-dung and clay; and it is usually considered by ornithologists that, as she builds very early in the spring and frequently in exposed situations, the mud lining protects the eggs and the young brood from the fierce March winds. Early in March we found a thrush's nest in our garden, containing four eggs; but the nest had not a vestige of the usual mud lining. Unfortunately we found the nest destroyed one morning before the bird had time to hatch, so it was impossible to note whether the inclement weather had any effect on the eggs. We have at this moment a blackbird sitting upon six eggs, four of which are her own and the other two those of the song-thrush. When first the nest was found it contained two of each kind, a thrush having laid in the blackbird's nest. Although sparrows will sometimes appropriate swallow's nests to build in, and though several birds will build a new nest on an old foundation, it is, I think, very unusual for one species—the cuckoo, of course, excepted—to make use of a nest built by another species. The third curiosity in nest-building is the nest of a chaffinch, placed in the fork of an elder-bush near our house. Usually the chaffinch assimilates the colour of her nest to the situation in which she places it; if she builds in a hedge she generally covers it with green moss; but if she builds, as she often does, on the bare branch of an old apple-tree, she uses the grey lichens, which are usually near at hand, and covers her nest with them so skilfully that though quite open and exposed it becomes hidden by its resemblance to a knob or excrescence of the tree itself. In this case, however, though the bird has recognised the necessity of covering her nest with *something*, she has rendered it most conspicuous by sticking little bits of white decayed wood all over it. The wood is so white that the nest looks almost like a snowball in the branches. Possibly this bird may be colour-blind, or she may be just a little bit "wanting" in her instinctive faculties, as human beings are occasionally in their reasoning powers. Why not?—*Robert Holland, Norton Hill, Runcorn.*

HOW LONG CAN A FISH LIVE OUT OF WATER?—A friend of mine some days since removed a gold-fish from a glass globe, on account of its having mildew (probably a parasitic growth of *Epistylis*). It was placed in a basin of water at night on the kitchen dresser. In the morning, at six o'clock, my friend discovered the fish was missing from the basin, and could be nowhere found. At past twelve o'clock at noon the fish was discovered behind some plates under the dresser; as it moved when handled it was placed in water, when it gradually revived, and is now as lively as ever. This unfortunate fish was certainly above six hours, possibly much more, out of its proper element, and in my experience I have never known one to survive one quarter that time.—*Henry Taylor, Peckham.*

SPARROW-HAWKS AND WINDOWS.—On hearing a dash against a plate-glass window in an adjoining room, I found a sparrow-hawk lying on its back, stunned, with its wings extended; taking it carefully up, after holding it in my hands for a minute I placed it on its legs close by a plate of water; it gradually recovered, tried its legs, and in about ten

minutes flew away. Kindness to it, was I fear, cruelty to other birds.—*A Subscriber.*

EARLY APPEARANCE OF THE SWIFT.—I was agreeably surprised this morning (May 1st) by the premature spectacle of a swift (*Cypselus apus*) hawking over this town. This is the more singular, from the fact that the other summer migrants have been unusually late in their arrival in this neighbourhood. The swallows appeared first on April 19th. I heard the cuckoo for the first time on April 26th, and the nightingale on the 28th.—*W. R. Tate, Blandford.*

WHAT IS THE BEST MIXTURE FOR "SUGARING"?—I have generally used coarse sugar, beer, and rum. Can any of your readers suggest anything more attractive for moths? Is it ever successful except in autumn?—*Walter W. Walter, The Gables, Stoke-under-Ham.*

HOW TO DESTROY ANTS.—Can any of your readers inform me of the most successful mode of destroying ants, so great a nuisance to many householders?—*George Pearce.*

"DITTANY," &c.—Will some botanical expert assist me to the exact name of the species of "*Dittany*" or "*Dittander*," and "*Dictamnium*"? The words frequently occur in the Elizabethan writers; but as their learned modern editors hold all natural history in contempt, they merely copy from the old dictionaries one after the other. The synonyms are all confused; as Floris says dittany is garden rue, while Cotgrave gives garden ginger, peppermint, &c.; then Halliwell says, the first is cayenne pepper, and another authority that there is no such thing; and Bentham (Handbook) adds that *Dittany* is "*the Fraxinella of Gardens*," and not a British species, while *Dictamnium* is always got over as a bastard sort of *Dittany*. Also, what species is the *Mandrake*, so common of mention by our early poets? Bentham has merely, "*Mandragora, an exotic*"; and your notice of the "*Rolls MS.*" says "*White Bryony*," a name not found in Bentham or Sowerby's "*Wild-Flowers*." The glossaries, of course, afford no help as to species. The English Dialect Society have long promised us a book of "*Plant names*," under the most competent editorship, but the long delay makes us despair of it in any reasonable time.—*Henry F. Bailey.*

AQUARIUM MATTERS.—Your correspondent Edward Step seems to have been lucky in hitting upon a mode of keeping aquaria without difficulty, and I am glad his system gives him satisfaction; but I think, if his washing-tub arrangement is correct, most of the readers of his letter, with any knowledge of the subject, will think that he is deluding himself with the idea that he is keeping aquaria, whereas he is only keeping a small ditch; for, that water can be kept clear and inodorous for any length of time in a tub in which there are all sorts of aquatic plants, animals, insects, &c., I much question; and that such fish as dace, roach, perch, trout, &c. will live many days in such water, my experience makes me deny. The tub, mud, and water arrangement may do very well for Edward Step if he only wants to keep objects for the microscope, but to fill a vessel with mud and water, and to place in it animals, fish, snails, insects, and plants, irrespective of quantity or selection, and let them fight and devour each other until they have established what he calls the balance of power, is about the queerest way of keeping aquaria I know of. It is acting upon such injudicious advice that has made aquaria-keeping so rare in private houses.

People have been told that they have only to get a vase or glass tank, fill it with water, put some mud or sand at the bottom, place water, plants, snails, fish, caddis-worms, reptiles, beetles, or anything they find in a river, ditch, or pond in it, and they will at once have a thing of beauty and a joy for ever: they do so, and, after weeks of patient waiting, they find they are keeping a mass of slimy decaying plants, dead fish, &c., in water which the wife or housekeeper declares is not only very odorous but very dangerous. If fresh-water aquaria are to be kept to be of any use or pleasure, they must be so upon a judicious selection of situation, plants, and live stock, which live stock are most accustomed to still waters, and if your correspondent had had a little more field and river experience before setting up his tub, he would, perhaps, have discovered that there are plants of the river, pond, ditch, and stream; and fish, mollusks, &c., of the same, each having its own habitat in which it will flourish.—*Ben Plant, The Crescent, Leicester.*

V. ANTIOPA.—I always thought that the difference between a foreign and a British specimen of the above-named insect was, that the former had a cream-coloured margin, and the latter had a white one; but during the last few months I have been often told that there is no difference. I should be much obliged if some of your entomological readers would give me an answer.—*W. R. Morse, Norwich.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

SCIENCE-GOSSIP BOTANICAL EXCHANGE CLUB.—We shall be glad to receive the names of all intending members. The subscription (5s.) is intended to cover expenses of carriage of specimens to and from those botanists who are engaged in naming them, postage, printing, &c. The scientific labour is in every instance gratuitously given. It has been thought, however, that even this sum might be too great for some members, and it is therefore decided that in the cases of *bonâ fide* working men, who may desire to become members, the fee shall be reduced to 2s. 6d. We feel certain that all members will at least desire that the Club shall be self-supporting.

W. H. L. (Bristol).—Your letter contained nothing but some granular red powder.

C. GOULD.—The "*Trumpet*," or "*cup-moss*" as it is also called, is not a moss but a lichen, called *Canomyce fixidata*.

X.—The spider's threads used for astronomical purposes are those of the Common Garden Spider.

J. W.—The specimen is that of the Common Primrose. Your other flower is that of the Wood Sorrel (*Oxalis acetosella*); and your fern the Maiden-hair Spleenwort (*Asplenium trichomanes*). Get Mrs. Lankester's "*Familiar Wild-Flowers*," with coloured plates, published by Hardwicke & Bogue, 192, Piccadilly.

W. A. PEARCE (London).—The enclosed water-plant is a pond-weed (*Potamogeton crispus*).

T. H. BUFFHAM.—The better plan would be to sow the seeds. You would then with ease determine the species; it will probably prove to be a *Galium*.

A. E. (Kelso, N.B.).—Thanks for your kind suggestions; in a few days we hope to send out the Rules of our S.-G. Bot. Ex. Club; we beg to acknowledge *Callitriche hamulata*.

R. F. Z. (Salisbury).—It is difficult to state why the leaf is discoloured, however we find the cells in the parenchyma are devoid of chlorophyll, excepting on one side, then only in very small quantity; you will be able to prepare a good microscopic object from the white part.

E. H. (Stepney).—Procure "*The Flora of Faversham, Kent*"; it is a most interesting and readable volume.

D. McD. (Edinburgh).—We have a very old proverb, well known in many parts of England, "*When the gorse is out of bloom, kissing is out of favour.*" The latter part is varied, as "*kissing is not in fashion.*"

S. B. (Oxford).—A few slugs and small worms for the common snake and blindworm will serve admirably as food. The same kind of food, with such dead flies as may be picked up from the windows during the summer, will supply the lizards. Keep both dry moss and sand at the bottom of your box.

"ARINAS."—We cannot undertake to say what the object you mention is without seeing it. It may be a fungus, but could only decide upon seeing it.

F. L. ST. A.—The Fritillary is a variety of *F. meleagris*. The fungus is *Polyporus betulinus*.

J. G. J.—Your beetles to hand. The larger one is *Dytiscus marginalis* (male); and the smaller is *Aclius sulcatus*.

B. M. O.—Your mosses are as follows:—A. *Hyppnum sylvaticum*; B. *Tortula muralis*; C. & D. *Hyppnum palustre*; E. *Weissia controversa*; F. *Hyppnum serpens*; G. *Fissidens viridulus*; H. *Bryum atropurpureum*; I. *Polytrichum commune*.

W. E. GREEN.—Your mosses are:—1. *Tortula nitida*; 2. *Bryum pseudotriquetrum*; 3. *Hyppnum albidum*; 4. *Hyppnum prelongum*; 5. *Hyppnum Knelfii*; 6 & 7. *Hyppnum cupressiforme*; 8. *Hyppnum Swartzii*, B.

EXCHANGES.

WANTED sections of common waxes, bone teeth, &c., foraminifera, feet and parts of insects, diatomaceous earths, &c., in exchange for well-mounted slides.—C. W. Lawton, 200, Essex-road, Islington, London.

ONE-HOLED eggs of Dipper, Wheatear, Creeper, Long-tailed Tit, Pied, Yellow, and Grey Wagtails, Red-winged Starling, Rook, Jackdaw, Magpie, Golden-winged Woodpecker, Kingfisher, Stock Dove, Turtle Dove, &c., &c., to exchange for Nightingales, Reed Wren, Owls, Wrynecks, or other eggs.—J. F. Pratt, Westgate, Ripon.

COLORADO Potato Beetles. Unset specimens to exchange for examples illustrating Economic Entomology.—R. S. Hulbert, 40, Catherine-street, Strand, W.C.

MATERIAL for slide of crystals for Polariscopes in exchange for good unmounted Entomological object (not wing).—Wm. Sargent, junr., Caverswall, Stoke-on-Trent.

BIRDS' EGGS, side-blown. Well-marked specimens, labelled, 300 varieties. Exchange for others new to collection. Sent at once for my list. All letters answered.—H. Sissons, Westbourne-road, Sheffield.

J. W. BULMER, near the Church, Northallerton, Yorks, will exchange small screw printing-press, type, &c., also bird eggs, for gold fish and other small fish for aquarium or fish-globe.

For *Gomphonema geminatum*, as collected, send stamped envelope with micro-object of interest, or a well-mounted slide in exchange.—James Simpson, 48, Arthur-street, Dumbiedykes-road, Edinburgh.

Poa bulbosa and *Corynephorus canescens* for 1479, 1483, 1484-1487 and other rare grasses, London Catalogue, 7th Edition.—J. Keogh, 25, Camperdown-place, Great Yarmouth.

For well-mounted palate of land-snail or slug send good slide, not diatoms or polariscopes object.—Henry Insley, 1, Back Chester-place, Gerrard-street, Birmingham.

LARVÆ of *Quercus*, *Salix*, *Dispar*, *Monacla*, *Castrensis*, *Trepida*, *Ceruleocephala*, &c., for Lepidoptera in any stage; or good Bird Eggs.—Roland Green.

WANTED diatoms mounted or unmounted, or any thing of interest, for crystals mounted, diatoms mounted *in situ*, zoophytes' palates mounted or unmounted, starches to show the adulterations of food, &c.—Arthur Smith, 198, Essex-road, Islington.

FOR insects mounted whole send mounted slides, clean, of diatoms, eyes of insects, diatom mounted *in situ*, &c. Only a limited number to exchange. Apply early.—Albert Smith, 193, Essex-road, London.

I HAVE SCIENCE-GOSSIP 1877, bound, photo of Darwin, two dippers (skins), and green woodpecker and Ray's wagtail (wired). Wanted British Coleoptera, Lepidoptera, side-blown birds' eggs, or mounted diatoms.—W. Barrett Roué, 165, White Ladies-road, Bristol.

WANTED in exchange for SCIENCE-GOSSIPS, Grattan's "British Marine Algae" either bound or unbound.—John D. Duthie, Stonehaven, N.B.

WANTED side-blown eggs in large quantities, every variety almost. Exchange as may be arranged. Correspondence answered from all parts, especially foreign.—John Wm. Sissons, Sharon, Sheffield.

RARE and local Suffolk plants during the season for exchange. Now ready Nos. 1239, 1237. Shall be glad to hear from former correspondents.—W. Jordan, Cockfield, Sudbury, Suffolk.

SCIENCE-GOSSIP for 1876 and 1877 offered in exchange for fossils or shells.—A. Harker, Spring Bank, Hull.

RARE Zoophytes and cleaned Foraminifera wanted. Will give in exchange good wood sections, soundings, and other material.—H. L., 6, Upper Phillimore-gardens, Kensington, W.

FOR slide of parasite of horse (*Trichoctes equi*) send a well-mounted parasite to W. A. Hyslop, 22, Palmerston-place, Edinburgh.

LONDON CATALOGUE, Nos. (7th Edition) 20, 27, 35 with bulbs, 93, 96, 203, 206, 299, 301, 398, 352, 516, 532, 550, 608, 645, 671, 726, 932, 995, 1015, 1169, 1387, 1405, 1442, 1452, 1501, 1586, 1623, 1652, offered for 10, 11, 46, 47, 48, 56, 66, 68, 92, 104, 116, 131, 251, 264, 270, 353, 360, 365, 369, 374, 396, 474, 495, 502, 566, 574, 590, 600, 620.—Wm. West, 15, Horton-lane, Bradford.

Asarum Europæum or *Asarabacca*. Specimens of this rare British plant in exchange for others of equal rarity, ferns preferred.—James W. Lloyd, Kington, Herefordshire.

SEVENTH Edition London Catalogue, *Juncus pygmeus*, *Carex capillarlis*, and others.—L. Tellow, 19, Radclyffe-street, Oldham.

FOR a slide of C. and Ancharote spicules send some object of interest, Foraminifera preferred.—A. Alletten, 11, Foley-street, London, W.

EITHER living or mounted specimens of *Zonites cellarius*, *Zonites excavatus*, for either pupæ, larvae, or imagos of moths or butterflies, British or Foreign, or other offers.—T., 26, Parker-street, Warrington.

NOEL Humphreys' "British Moths," *Macro* and *Micro*, splendidly coloured. Wanted eye-piece or object glass for microscope.—W. Harper, Norfolk-park, Maidenhead.

WANTED parts of Foreign Beetles and Butterflies, Foraminifera, Zoophytes. Stained anatomical preparations and all kinds of unmounted material in exchange for good specimens.—Alpha, 16, Brunswick-street, Poplar, London, E.

EGGS of sparrowhawk, bullfinch, common bunting, red wagtail, chiffchaff, &c., in exchange for others.—G. B. Wood, Lindow Grove, Alderley Edge, near Manchester.

WANTED *Bulimus Kevei* and *Bulimus Portei* and other Philippine land shells. Many rare species offered in exchange, British and Foreign.—Address, F. M. Hele, Fairlight, Elm-grove-road, Cotham, Bristol.

A NATURALIST, who is going on a dredging cruise round the South and West coast of England, would be glad to hear from a gentleman having similar tastes who would be willing to join him and pay a small part of the expense. For further particulars address C. P. Ogilvie, F.L.S., Sizewell House, Leiston, Suffolk.

Salix alba, var. *caerulea*, offered for other good plants; rare species of *Rubus*, *Rosa*, *Pyrris*, *Carduus*, *Hieracium*, *Salix*, *Scirpus*, and *Carex* especially desired.—E. W. Andrews, University School, Hastings.

WANTED, SCIENCE-GOSSIP for 1874-5-6, except Oct., Nov., and Dec. 1876. Offered, double the number of weekly parts of "Nature" and a quantity of consecutive numbers of the "Garden" or offers.

FOR disposal, at a very cheap rate, a beautiful series of polished sections of Carboniferous corals from Clifton, Bristol.—Apply to S. G. Perceval, Henbury, Bristol.

L. C. Nos. 135, 209, 235, 253, 555, 556, 577, 581, 605, 653, 683, and many others, for other rare plants. List exchanged.—J. Tempère, 10, Heald-place, Rusholme, Manchester.

BOOKS, &c., RECEIVED.

"Flowers: their Origin, Shapes, Perfumes, and Colours." By J. E. Taylor, Ph. D., F.L.S., &c. London: Hardwicke & Bogue. Price 7s. 6d.

"Tropical Nature." By A. R. Wallace. London: Macmillan & Co. Price 12s.

"Nutrition in Health and Disease." By Dr. J. H. Bennet. Third Edition. London: J. & A. Churchill.

"The Planisphere, and How to Use It." London: J. E. Catty.

"Transactions Watford Natural History Society."

"Industrial Art." May.

"Land and Water."

"American Naturalist." April.

"Potter's American Monthly." April.

"Familial Science and Fancier's Journal."

"Science pour Tous."

"Chambers' Journal." May.

&c. &c. &c.

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



THE PRONUNCIATION OF SCIENTIFIC NAMES.



THE question as to "the pronunciation of scientific names" which has been raised and discussed in some of your recent numbers, is one in which I take a considerable interest. The subject is only one branch of the much larger question now

being freely discussed amongst scholars—the proper pronunciation of Greek and Latin words generally—whilst, under another aspect, it is only one branch of that well-named "Opprobrium Botanicorum"—the subject of botanical nomenclature, a subject upon which I have a few crotchets, which I should be glad, on some future occasion, to have the opportunity of airing in your journal.

Your correspondent Mr. Newlyn makes two assumptions, from both of which I beg leave to differ. First, he assumes that we have no means, except *accentuation* (by which, from his reference to "the poets," he plainly means *quantity*), to guide us to a knowledge of the mode of pronunciation which the Greeks and Romans themselves adopted: and, secondly, he assumes that "university men" at the present day acquiesce in the barbarous practice of English scholars during the two or three last centuries only, of pronouncing Greek and Latin words as if they were English; whereas those who know the Universities know well that both there, and in our large public schools, a sturdy effort is being made to bring back the pronunciation of Greek and Latin words to what we have good reasons for knowing, or believing, was the actual pronunciation in a Greek or Roman mouth of classical times. And to those who give themselves to the study of the subject, indications of the old method of pronunciation are not wanting; although the difficulty of arriving at a satisfactory solution is greatly increased by the fact that then, as now, the pronunciation in different

provinces at the same time, and in the same province at different times, varied considerably.

However, means for recovering the old pronunciation are not wanting to those who are on the lookout for them. One principal source of information is the mode in which the ancients represent natural sounds, which certainly have never changed, and for the vowel sounds this alone is almost sufficient. Thus, Aristophanes, in the "Acharnians," introduces a countryman with a pig under his arm. And the part assigned to the pig is written (I write in Roman, not in Greek letters) *koi—koi—koi*: now let any one repeat *ko-ee, ko-ee, ko-ee*, several times, rapidly, and he will find that it gives perfectly the sound of a pig's squeak, and leaves no room for doubt that by Aristophanes and his contemporaries the letter *i* was pronounced *ee*. Again, the Latin word for a breast is *mamma*. And there can be no question that a Roman infant called for the breast in exactly the same sounds as an Anglo-Saxon infant calls for the mother who presents it to him, pronouncing the *a* as *ah*. So—*cuculus* (the cuckoo), *ulula* (the owl), *mugire* (to low like a *moo-cow*), supply plenty of proof that *u* was sounded like double *o*; not as we sound it, as if it was written *yoo* (which is really a diphthong—*ee-oo*).

Then as to consonants. That *c* was always pronounced hard before *e* and *i*, as well as before *a*, *o*, and *u*, is manifest from many indications. Thus, it always represents the Greek kappa, in words derived from the Greek; *e.g.* *Kentauros* is represented by *Centaurus*. *Kimmerioi* becomes *Cimmerii*, and (by transposition) in English *Crim-Tartary* and the *Crimea*, which shows that the *c* was pronounced hard when the transposition was made. A very clear indication of the hardness of the *c* is afforded by those very numerous places in Ireland which begin or end with *kil*, such as *Kilkenny*, *Clonkill*, &c., all of which were formerly the seat of a monastery, known as *Cella* (alluding to the solitary chambers of the monks), and proving most convincingly that the *c* in *cella*, in the early centuries of the

Christian era, was pronounced as *k*. Again, a joke preserved by Quintilian serves to show that *qu* was also pronounced like *k*, not, as in English and modern Italian, as *coo*. Quintilian mentions that a man who had formerly been a cook, but had risen in life till he had become a great swell, having on some occasion said something insulting to a man who knew his origin, the latter replied, "Et tu quoque," where the whole force of the joke lies in the pronunciation of *quoque* and *coque* being identical.

But I must not continue these illustrations at a length which would suit a philological rather than a natural history journal. Suffice it to say that there is plenty of proof of the sound of all the vowels, and of most, if not all, of the consonants. And I live in hopes that, if not the present, the next, or perhaps the *paulo-post-futurum* generation will not only, by careful research, have recovered the genuine old pronunciation, but will make use of it in reading or speaking Greek and Latin.

But when we have arrived at the conclusion of its being both desirable and possible to pronounce Greek and Latin literature as Greeks and Romans would have pronounced it, it still remains to consider how far it is either desirable or possible to pronounce botanical, or other scientific terms, according to the rules of genuine Greek or Latin pronunciation. As regards genuine Greek or Latin words, such as *Geranium*, *Hieracium*, *Cineraria*, I know no reason, except persistence in a vicious custom, why they should not be pronounced in proper Greek or Latin fashion, with the *c* or the *g* hard. But what are you to do with the atrocious barbarisms, the disgrace of all sciences alike, with which the bad taste of modern times has encumbered our nomenclature? Take such words as *Brownii*, *Smithii*, *Lecocquii*, *Hookeria*, *Schenckeria*, and (worst and most frightful of all) *Warszewiczii*. No rules for the pronunciation of Greek or Latin words will ever enable any one to make any of these sound in the least degree like a Latin word. And for this very good reason; namely, that they are not Latin words, but only English, French, or German, slightly disguised by having a Latin tail tacked on to them; and reminding one very much of the statues of old George III., with his stiff pig-tail protruding, clad in a Roman toga, or a Greek chlamys. With such words, as I fear it is quite hopeless to get rid of them, the only thing to be done is to mark their bastard and mongrel origin, by pronouncing them, the head according to its nationality, and the tail only in Latin fashion.

How the Romans themselves would have dealt with these uncouth sounds we are not left to conjecture merely. A characteristic instance presents itself in the place at which I am now writing, Church Stratton, in Shropshire. Close by is a hill, on which the British chieftain Caradoc maintained his last fight against the Roman power. The hill still bears his name, and is called *Cavr Caradoc*, the Seat of

Caradoc. This name (with the accent on the penultimate syllable, according to the general rule in Celtic words) is obviously the original of the, not uncommon, surname of *Cradock*, or *Craddock*. Now, suppose the discoverer of a new plant, wishing to honour a botanist of the name of Cradock, in all probability he would designate his discovery by the hideous title of "*herba Craddockii*." But what did the Romans themselves do with such an unaccommodating word? Now it so happens that one of the most classical of Roman writers, viz. Tacitus, had a good deal to say about Caradoc, but he has adapted his name to Latin ears, and speaks of him always as *Caractacus*. Plentiful instances of this adaptation of names occur even in Scripture, to which I need not more particularly refer. The New Testament version of Old Testament names, such as *Jesus* for *Joshua*, *Elisus* for *Elisha*, &c., shows the principle upon which the writers of that age proceeded. In the time of the Renaissance they adopted a, perhaps better, plan, wherever it could be resorted to; that, namely, of *translating* those names which (as is the case with most) have a distinct meaning. Thus, *Hauschein* becomes *Æcolampadius*; *Schwarzerd* is rendered *Melanthon*; *Hahn* is known as *Gallus*; and so on. Now, if these writers had been botanists, instead of theologians and musicians, and it had been desired to commemorate them by giving their names to plants, we should have been tortured by the barbaric words—*Hauscheinii*, *Schwarzerdia*, *Hahnii*, &c. &c., instead of the equally commemorative, but far more euphonious designations of *Æcolampadii*, *Melanthonia*, *Galli*, &c. And why cannot we now adopt the same plan, and instead of *Brown* take *Fuscus*, for *Smith* write *Faber*, for *Hooker*, *Hamator*, &c. &c. &c. Linnæus himself is, no doubt, responsible for many of the uncouth names with which botanical nomenclature abounds. But even he on occasion could make a concession to cuphony, as witness his turning such a harsh-sounding word as the German for a sore-throat, *Breune* (pronounced Broina), into the pleasant-sounding *Prunella*.

But the great difficulty in the way of a correct pronunciation of classical and pseudo-classical words used in botany is undoubtedly the question of quantity; and it is perfectly astonishing, in turning over botanical works, written, too, by persons who are supposed to have some scholarship, to see the flagrant blunders and erroneous marking of quantities which they exhibit. Many of these are simply the result of carelessness, and arise from the author not giving himself the trouble to think for a moment of the real origin of a word. Thus the very common pronunciation of *Cenothéra*, with the *e* short, arises only from the carelessness of not remembering that the plant originally so called (by Dioscorides I think, but I have not got him at hand to refer to) was used by the Greeks as we use olives, to give an appetite for wine, and thence derived its name from *Oinos* and

Thërao. The latter word spelt with an *eta*, and therefore as long as daylight on the 21st of June.

But the real difficulty, especially in Greek words, or words derived from the Greek, arises from the conflict between *accent* and *quantity*, the true principles of reconciling which are as yet but very imperfectly understood. Thus, I can even find an excuse for some persons who will pronounce the *i* in *Veronica* short, although they know its origin (from *Vera cikon*), and that the *i* represents the diphthong *ei*. But then the Italians throw back the accent and call the Saint *Santa Verónica* (with the accent on the *o*), which has the effect, to careless ears, of making the *i* seem short. But no such excuse can be offered for making the *i* in *Hypericum* (from *hyper cikon*) short, or the *e* long. In words like *Conium*, *Geranium*, *Hieracium*, &c., indeed accent has beaten quantity out of the field; and despite the fact that the *i* in these words represents the necessarily long diphthong *ei*, we always pronounce according to accent, which is thrown back on the ante-penultimate, just as we do in speaking of *Arius*, or *Alexandria*, although in the original Greek the words are *Areios*, *Alexandreia*. But what are we to do in such a case as *Sisymbrium Sophia*? Are we to pronounce the *i*, according to accent, long, as we do in the common female Christian name, or short, according to its quantity, as we do in pronouncing *Philosophia*. And the worst of it is, that even in this matter of accent we are so abominably capricious. Thus the tendency in English to throw back the accent will perhaps account for our making the *o* in *anemone* short. But why, in the world, in defiance of this tendency, and against every rule of quantity, do we make the *a* in *Clematis*, and the *o* in *Gladiolus*, long?

After all, however, as the great majority of communications upon botanical subjects are made in writing, it matters only to a few professors, who are called on to deliver lectures orally, and their pupils, how the words are pronounced. But as they are regarded as authorities, and their practice gradually rules that of the ordinary run of students and amateurs, it is a great pity that the leading men amongst them do not establish some agreement between themselves as to the principles which should for the future prevail in the pronunciation (and, I would add, the formation) of classical and pseudo-classical words, adopted, or to be adopted, into the botanical vocabulary.—CHAS. BROWNE.

AQUILEGIA.—This word is generally believed to be derived from the Latin root *Aquila*, an eagle. Is this correct? Is it not rather obtained from an old word, *Aquilegium*, signifying a gathering of water. The spurs of the petals are often partly filled with water, or some honied secretion; in early times they may have been thought to be to collect rain or dew, hence its subsequent generic name; but the resemblance in any way to an eagle must be very far-fetched; besides, look at the long terminology if it is really derived from *Aquila*.

THE TEETH OF THE BLOW-FLY.

BY THE REV. L. G. MILLS, LL.D., F.R.M.S., &c.

DURING the summer of last year I made a careful examination of the proboscis of the Blow-fly, with a view to determine the particulars of its structure, and to discover the causes of the difficulties* which have been felt by some, in their endeavours to get a clear and distinct view of the teeth, and their failure to trace them in the position which they are now well known to occupy.

I was the more anxious to make this examination, because, long before Mr. Suffock or Dr. Lowne had given any account of these teeth, I had been very successful in mounting many specimens of the entire proboscis, upon Mr. Topping's plan, and, quite satisfied with my performance, and the beautiful view of the general structure, I did not observe anything to lead me to suspect even the existence of teeth in these preparations. However, when I read Mr. Suffock's paper, as given in vol. i. of the "Monthly Microscopical Journal," and having studied the illustrations there given, I re-examined my preparations, and, on a few of them, I was able to verify the account, and clearly to see the teeth as figured in the "Microscopical Journal." The causes of my failure to discover the teeth until my attention was directed to the fact of their existence, may have some relation to the difficulties that are still felt by some to see them, and their vain endeavours to trace them, even with the knowledge of their position, and on slides of especially prepared dissections.

I desire therefore to give the reasons for these difficulties as they appear to me; to give a clear figure and explanation of the structure of the teeth; and to give a method of preparation whereby even the unskilled operators may succeed in mounting simple dissections that will give very distinct and unmistakable views of them in their position, and show their particular structure.

In whatever way the proboscis may be mounted, it is important to observe that the pseudo-tracheæ be upwards,—that is, next to the thin covering glass. A mistake on this point would, of itself, be sufficient to prevent any clear view of at least two of the three rows of teeth. The object is usually examined with a quarter-inch object-glass, and by the aid of transmitted light.

Now, it is plain from the nature of the proboscis, that the light from the mirror must pass through the two membranes of lips before it can fall upon the teeth. One of these membranes, the lower, appears to be thickly dotted with dark spots, due to a number of hairs that are closely set on that membrane, and two of the rows of teeth, at their free ends, are very transparent, and pale in colour, and they

* SCIENCE-GOSSIP, Vol. XII. page 69.

terminate a little above and near to the strongly-marked ends of the pseudo-tracheæ.

These tracheæ and the dotted membrane obscure the view of the teeth, and, in many cases, it is only by a particular and careful management of the mirror that it becomes at all possible to discern the thin lines of light or shade that mark the outlines of their bifurcate extremities.

Further, in mounting the object upon Topping's plan, pressure is used on the head of the fly with the design of throwing the proboscis into position of expansion before being fixed on the slide, and in doing

As may be seen in the foregoing figure, there are three rows of teeth. These lie one above another, and their free ends crop out between the lines of the pseudo-tracheæ. The teeth of the first or uppermost row are simple and strap-shaped chitinous bands, and for a considerable portion of the length of each tooth the band is turned in on each margin, and then for the remainder is flattened out and widened before it is terminated in the thin and knife-edged bifurcate extremity.

The teeth of the second row differ somewhat in form from those of the first. Each tooth is not a

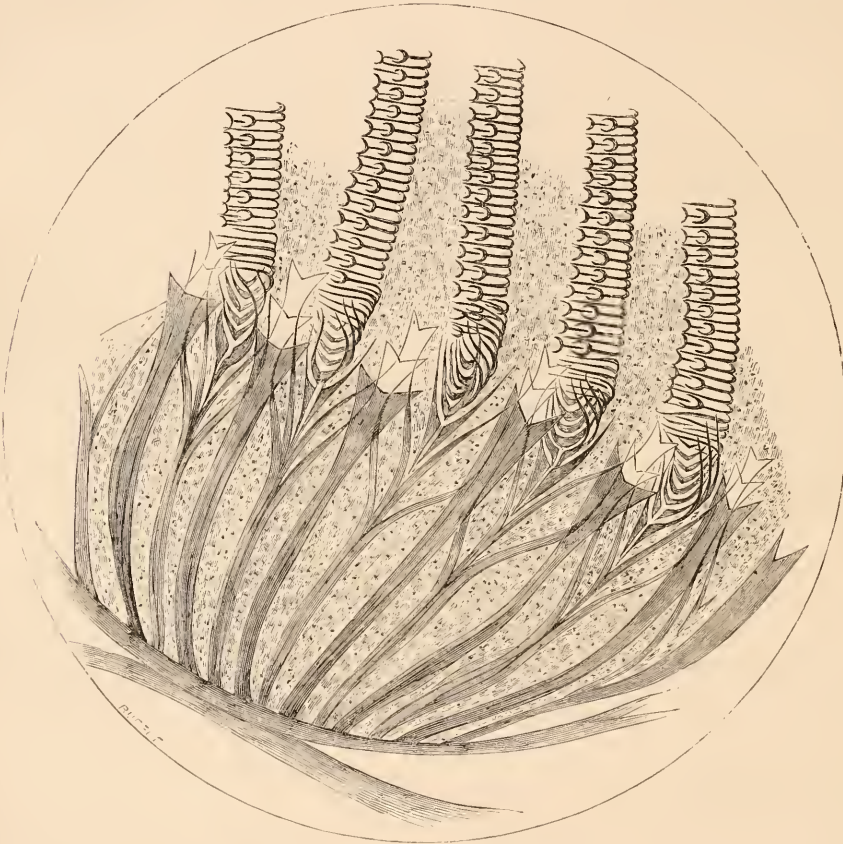


Fig. 100. Teeth of the Blow-fly (mag.).

so a dark reddish fluid generally passes into the proboscis between the membranes and under the teeth, thus giving an additional hinderance to the view required. I had found that prolonged steeping in turpentine will bleach the teeth rather than remove the stain, and only increase the difficulty of examination. Sometimes, however, a case will occur in which this latter difficulty, even without especial caution, will not arise; then the teeth and pseudo-tracheæ will be fairly seen, as in the following figure of a small portion of one of the lips of the proboscis.

simple and single strap, but, for about two-thirds of its length, is a divided one, and springs from two different points of attachment, as in the following figure.

The two bands of chitine join, and are then flattened out and terminated as in the tooth of the first row, but much fainter in colour, and by no means so easily distinguished and observed.

The teeth of the third row are similar in structure to those of the second, but only of half their length, and they spring from quite different positions in the

lips,—namely, from the points in which the bands separate which go to form the teeth of the second row. This will be clear by reference to fig. 101, where the points p p' are those from which one of the teeth of the third row has its divided origin, u , where the bands unite and become flattened out; after which the tooth is soon terminated as in the teeth of the other rows, but still thinner, sharper, paler in colour, and more delicate in outline, so as frequently, with every care and the best appliances, to be difficult to observe.

The explanations I have given are I think sufficient,

tracheæ become gradually changed as they approach toward the teeth; that each tooth of the third row is but a simple development of the nearest rings of the adjacent pseudo-tracheæ; the teeth of the second row but a further development of those of the third; and finally, the strongly-marked simple strap-shaped teeth of the first row are but further and final developments of those of the second.

It now only remains that I should suggest a plan by which any ordinary operator with but little skill may prepare slides that will afford distinct views of the teeth as well as of the pseudo-tracheæ.

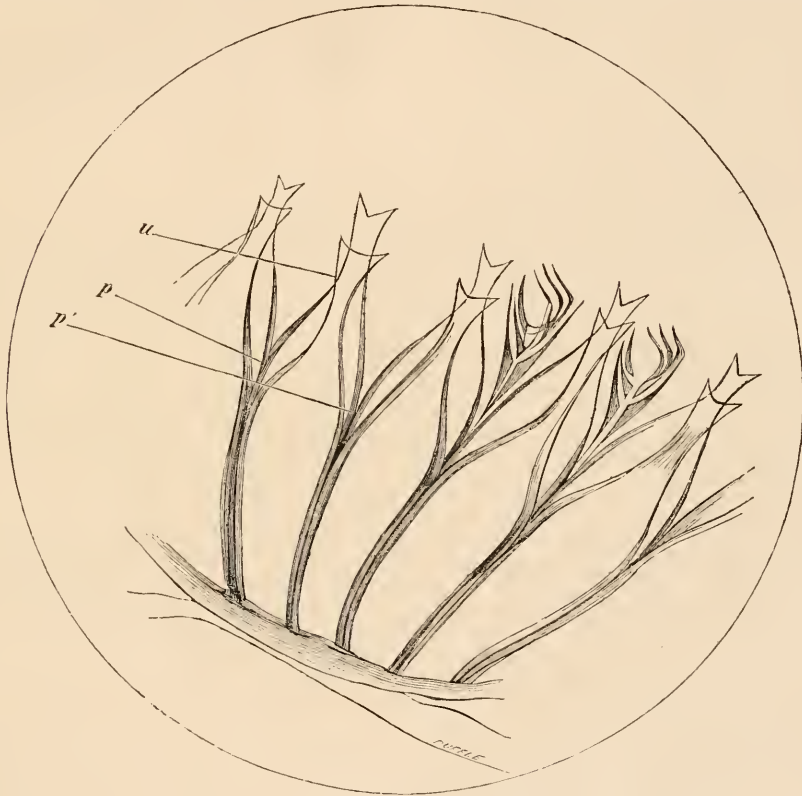


Fig. 101. Teeth of the Blow-fly (mag.), showing teeth springing to different positions.

and it will appear that the arrangement of the three rows of teeth is such as to permit their superposition with the flattest possible surface, and consistent with the greatest steadiness of position.

By contrasting the structure of the broken rings of the pseudo-tracheæ at about the centre of one of the lines with those at the termination of the line, and near to the teeth, and comparing these latter with the teeth themselves, I think it will appear that, after all, the teeth are but developments of the pseudo-tracheæ, and that the transition from the one form of structure to the other is by no means abrupt, but that, on the contrary, the rings of the pseudo-

Press the head of a blow-fly gently between the finger and thumb so as to cause the proboscis to shoot out and the lips to expand, and then, with a fine pair of scissors, cut off the lips when expanded close to the mentum, and place them in a watch-glass containing three or four drops of water. To insure success, proceed thus in three or four instances, until there are several examples of the lips in the watch-glass. Place the watch-glass with its contents in a good light and upon a slip of white paper. Add to the water about two large drops of spirits of wine and two or three drops of strong liquor ammoniæ; mix with a camel-hair pencil, and watch the action of

the ammonia until it has caused a complete diffusion of the red stains within the objects : this it will do in a few seconds. Now transfer the objects to another small vessel or watch-glass containing pure water alone, and wash and press them with the camel-hair pencil. It will be well to change the water a few times during the washing. The ammonia will now be partially cleaned off, but yet the diffused red stains will remain within the objects, and must be removed. To do so, place the objects in a drop of water on a glass slide, cover with a thin glass, and use a tapping pressure with a needle. The reddish fluid will pass out of the objects, and they will become quite clear. Retain a steady and easy pressure with a wire spring clip, and put the slide into a cup of water, and move it frequently with an alternate dipping and draining action, to wash away the expressed fluid and every trace of ammonia. The objects may then, whilst still under pressure, be allowed to become dry, gradually, in the usual way, to prevent any too sudden or too great contraction, and, if subsequently treated with turpentine, they may be finally mounted in balsam.

I have now in view, under a good quarter-inch object-glass, a slide containing seven such lips, prepared a year ago, and on most of them the teeth can be seen with a clearness of definition and a precision of outline that leaves nothing to be desired ; and I feel no inclination whatever to attempt any further experiments at improvement by mounting in either gum damar or glycerine : I am quite satisfied with the old-fashioned Canada balsam, and the beauty of the results of the process I have described.

HOW TO MAKE AN HERBARIUM.

(Continued.)

By JOHN W. BUCK, B.Sc.

IN speaking of laying out the specimens, I omitted to give one hint which may be of service : I refer to the judicious use of the scissors. It will sometimes be found advantageous to cut away leaves and blossoms, from what we may call the back of the plant, when there are too many of them, and when they would conceal one another's shape by their number. It has the effect also in many cases of making the specimen look more natural, since, when growing, the branches of a bushy plant do not incommode one another, but spread out equally on all sides. A bunch of berries—those of the spurge laurel, for example—must generally be partly cut away. Sometimes it is well to postpone the operation until the specimen is dry and ready for mounting. But be very cautious that in cutting you do not disfigure the plant, or deprive it of some important feature. Every plant has its characteristic kind of inflorescence, or flower-arrangement, and also of leaf-arrangement, and if you snip away recklessly you will produce

effects that will sadly puzzle any botanist who may afterwards look over your collection.

The pressure necessary for the thorough preservation of the plants may be caused by large books laid over the papers, with a few bricks on the top, or by strapping the papers together between two strong boards. The latter plan I prefer, and almost always make use of, because the whole affair can be carried about from place to place if required, or set before a fire to dry quicker, which is often a great convenience. I need hardly say that, however the plants are pressed, they should always be in as dry a place as possible. As regards the amount of pressure to be applied, it should be borne in mind that the object is not to squash the plants but to keep them flat and dry them ; and hence, especially with succulents, a too excessive pressure should be avoided. If, however, enough paper be interposed and the specimens well distributed among the sheets, ordinary plants will take no harm under any reasonable pressure.

In transferring the plants, when changing the sheets of porous paper, it will be found advantageous not to lift up each plant by itself and place it on another sheet, but to adopt the following plan. After having lifted away the damp sheets above the plant—which must be done with great care, by turning them slowly back with the right hand while guiding and moderating the operation with the left, which should be held down on the upper surface of the paper you are removing,—place a dry sheet over the plant. Then take up the two uppermost sheets, with the plant between them, carefully invert them, lay them on the pile of dry sheets, and lastly skin off the damp sheet in the same way as before. Even by this method it will not be found easy to keep the blossoms and leaves of some plants smooth, as they are so apt to stick to the papers. All blossoms that are at all troublesome had better be dried separately ; and in the case of such as poppies, they should be protected by a couple of pieces of tissue-paper, which should not be removed until the drying process is quite over. The chief difficulty in transference will be found only while the plants are damp, and will disappear entirely as they get drier. The damp sheets should be completely dried before using them again, by exposing them to warm, dry air.

There are several ways of judging when the plants are dry. In the first place, a thoroughly dry plant is generally rigid, unless it be very long and weak. Feeling of the plant by the lips, or placing the hand on the sheet of paper from which it has just been taken, are other tests, but in these cases you must distinguish between coldness and dampness. Generally speaking, you may rest satisfied that if the specimen has been under pressure, with dry and frequently-changed papers, for eighteen or twenty days, it is likely to be quite dry, unless its nature is such as to make the matter doubtful.

Now comes the mounting, which should not be

deferred; as postponing it probably means spoiling the specimens and losing the labels, and certainly means an accumulation of work at some future time. For fixing the plants, some recommend the application of hot glue; but this is very troublesome to manage, and as the operation of carefully gluing a large specimen is rather a long one, the glue is not likely to be very hot when the time comes for fastening it down. Strong gum answers quite as well and is more convenient. To make the gum, take one ounce of picked gum arabic, as colourless as possible, powder it, and stir it with a clean stick or a glass rod in an ounce and a half of cold water until it is dissolved; add a quarter of an ounce of powdered gum tragacanth ("gum dragon"); and lastly, add two grains of corrosive sublimate previously dissolved, along with two grains of sal ammoniac, in one drachm of water. A metal stirring-rod should not be used, as it is apt to discolour the liquid. The latter, if carefully made, is quite colourless, and does not show much, if any be accidentally smeared. (N.B.—Corrosive sublimate is very poisonous, and the bottle of gum containing it should be labelled "Poison.")

To mount the specimens, lay them on a sheet of brown paper or newspaper, gum them carefully all over the back, and then lay them gently on the white sheet in the best position, which you should have previously decided on, and press them down with a clean handkerchief. Use no more gum than is absolutely necessary, and wipe away any excess at once. A good plan with a very large or weak plant is to gum the back of the stem, fix it by a gentle pressure, and then turn up the leaves and flowers one by one, gum them, and then lay them back again in position. Another method, which I remember trying once with a long trailing pimpernel, and which succeeded well, was to gum it on the back as before; shift it, still face downwards, to a sheet of brown paper the same size as that on which I was going to mount it, arrange it as I desired, and lastly turn the white sheet down over it. On lifting it up, it of course brought the specimen away with it. The delicate blossoms which have been separately dried should next be placed in their natural position, care being taken to hide any awkward appearance of a join in the stem. Long plants, too long to lie on one sheet, should be cut in two pieces and these laid side by side; and if the stem be very long and a piece of it be permanently removed, the cut ends should not be brought close together, but it should plainly appear that a piece of the stem is absent. All parts of the plant should be shown as far as they can, and on the same sheet. For instance, somewhere on the dandelion sheet should be shown the globular downy seed-head, and with the strawberry plant the strawberry fruit itself, which latter, notwithstanding its succulent nature, may be easily dried, if not too ripe to begin with. These should not be made to appear as if growing from the same plant as in flower unless they were actually

found so growing. In fact, in mounting such parts, nature must be imitated, not contradicted. A few slips of well-gummed paper of the same kind as that you are mounting upon should be kept at hand, with which to fix down stiff stems, which often have a tendency to part company with their sheets.

Labelling should be done immediately after mounting. To keep the names, localities, and dates of the plants while pressing, the particulars may be written on small scraps of paper, which must be transferred each time with the respective specimens whenever the sheets are changed. I have found this plan answer best in practice, as if the entries are made in a notebook there is a danger of afterwards mistaking one plant for another. But however these facts are preserved, as soon as a specimen is fairly mounted they should be transferred to the right-hand bottom corner of the permanent sheet. They may be written thus:

Rhinanthus Crista-galli,
(Yellow-rattle),
Hayfields, near Freshford,
10. 6. 78.

(Collector's name.)

Or printed labels may be obtained with spaces to be filled up. After mounting and labelling, the sheets should be again pressed flat for a day or two.

But the young botanist who does not wish to have a good deal of trouble thrown away, and to see his well-dried specimens devoured by insects, has more work before him yet. Mould is not likely to trouble him with plants which have once been made completely dry. A botanical friend, to whom I am indebted for several of these hints, writes: "At one time, in the very wet summer of 1875, and when I had my press so full that scarcely more than two sheets were between plant and plant, I found, to my disgust, many of them moulding. But I took heart and brushed off the mould with a moderately stiff brush continually till they were thoroughly dry, and then stacked them away between thin dry sheets, and did not look at them again till nine months afterwards, when I found them without a particle of mould. Later on, I cured some of the mould by brushing it off and washing the plants with corrosive sublimate, while they were still in the press. But, by pressing few at a time, or by using more paper, I might, of course, have escaped that; and it does not do to trust to being able to get rid of the mould so, for it discolours the specimens." But all plants are more or less liable to the attacks of insects, and some, as the *Ranunculaceæ*, *Cruciferae*, and *Umbelliferae*, especially so. The best preventive is corrosive sublimate. The Rev. Gerard Smith recommends dipping *Ranunculaceæ* (Buttercups) and *Cruciferae* (Shepherd's Purse, Cuckoo-flower, &c.) before pressing, into a saturated solution of corrosive sublimate in equal parts of rain-water and methylated spirits. A more convenient plan is to paint the specimens with the liquid after they are mounted. For this purpose

a solution should be made of one quarter of an ounce of the sublimate in half a pint of methylated spirit (not "methylated finish"), which is to be applied to the specimens with a pretty stiff brush, taking care that it penetrates all corners and crevices. Every plant should be treated in this way, as it not only prevents the attacks of insects in the future, but entirely destroys any animal life that may be already there. The sheets are then to be again subjected to pressure for twelve hours, after which they will be ready for the herbarium.

It only remains now to arrange the specimens in proper order, but as it is unnecessary to do this until a large number have been collected, we will leave the consideration of it at present. Meantime the sheets should be laid flat in a box, secured from dust, kept in a dry place, and not exposed to the light more than necessary.

A RARE ACARUS.

(*Glyciphagus plumiger*.)

IN the February number of SCIENCE-GOSSIP I announced the capture, for the first time in this

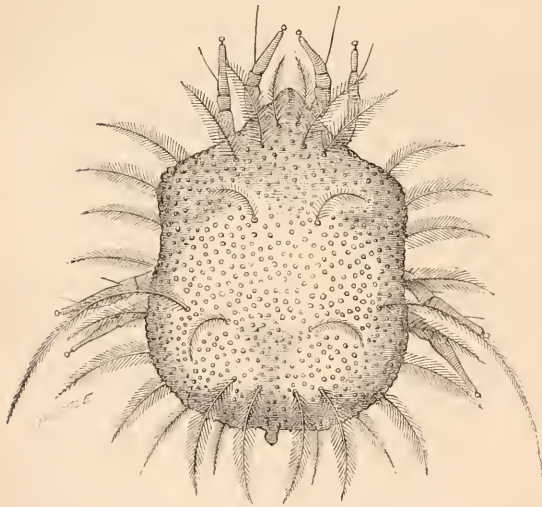


Fig. 102. *Glyciphagus plumiger* (mag.).

country, of that singular and beautiful acarus *Glyciphagus palmifer*, which since that time I have bred pretty freely in confinement. Whenever I have visited the same locality subsequently, I have not failed to search in the hopes of finding what may be called the companion mite, *Glyciphagus plumiger*, but up to a late period unsuccessfully. On my last visit, a few weeks ago, my search was unexpectedly rewarded by finding a single specimen of this species, which is scarcely less beautiful than *Palmifer* itself. I say unexpectedly, because I found it where I did not anticipate doing so. Messrs.

Robin and Fumose, the highest living authorities, who have treated of these two species in a most exhaustive manner in the "Journal de l'Anatomie et de la Physiologie" for 1868, say that it is found chiefly in the dust and walls of damp cellars along with *Palmifer*, and there I looked for it without finding it. I eventually found it in fodder in a stable, where I was looking for other mites, and I find that this is the place given for it by Koch, in his "Deutschlands Crustaceen, &c.," published in 1834; and Robin does not omit its being found there.

I am not aware that there is any record of the capture of this species in this country hitherto, and the late Andrew Murray, in his "Economic Entomology," treats it as not having been yet found here; but Mr. George, of Kirton-Lindsay, informs me that he has in his possession a single specimen which some gentleman in that neighbourhood found, also in hay. As therefore it has been found in two remote parts of the country, between which there would not be likely to be communication, and which are both agricultural, we may, I think, fairly claim this as a British species, although only a single individual has been detected in each instance.

The genus *Glyciphagus* was founded by Hering upon the type of a mite which he found in dried prunes; and taking only the conspicuous characteristics, it may easily be known by the following;—viz., 1. legs of five joints, terminated by a small sucker and very minute single claw; 2. the skin of the back being closely and irregularly plicated, so as to have a soft look; 3. the hairs on the body being either plumose or developed into transparent leaf-like expansions; 4. the females having a small conical projection or button on the anus, the use of which is not at present known. The last two characters are practically almost sufficient for identification.

The leaf-like membranous hairs are peculiar to *Palmifer*; the plumose hairs attain their highest development in the present species, no other known sort approaching it in this respect, and it is to this fact that it owes its peculiar beauty; the hairs, indeed, remind one of miniature ostrich-plumes, as will be best seen by the drawing, which I think may possibly be of interest, because it is carefully drawn from the female, and I am not aware that the female has hitherto been figured. Robin's beautiful illustration is of the male only, and Koch's, which does not state sex, is, contrary to his usual habit, so poorly drawn that it might be either, but I think it is the male. The sexes both in this and *Palmifer* are very different and easy to distinguish. The average length is about 35 mm., and the width about 25 mm.

A. MICHAEL.

NOTES AT THE BRIGHTON AQUARIUM.

THE cunning exhibited by the Angler (*Lophius piscatorius*) in the capture of its living prey is a matter of ancient history, and naturalists, from the time of Aristotle to the present day, have variously commented on its extraordinary manœuvres. The researches carried on during the cruise of the *Challenger* have recently revealed further interesting details respecting the genus, for closely-allied species were dredged in the Atlantic, at a depth of over 2,000 fathoms, with peculiar modifications of structure fitting them for life in the comparative darkness of their habitat in the oceanic abysses.

A fine specimen of the British species has now been on view in a living state in the Brighton Aquarium for many months, affording an opportunity of studying its habits to unusual advantage, and illustrating the general accuracy of the descriptions

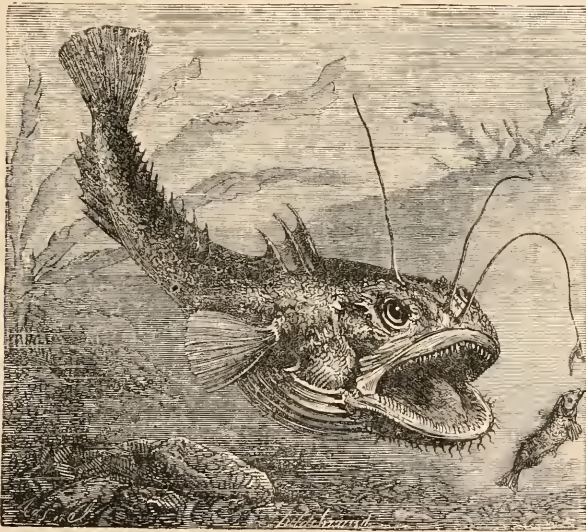


Fig. 103. Angler-Fish (*Lophius piscatorius*), from Taylor's "Aquarium."

given by Messrs. Yarrell and Couch in their admirable works on the history of British fishes. The absence of the Angler from aquaria hitherto, has certainly not been owing to any unusual delicacy of structure, for it is a hardy fish and very tenacious of life, but has resulted rather from the difficulty of procuring it a supply of the living prey necessary for its support, and also from the obstinate sulkiness of the creature, which caused it to refuse food when such was forthcoming; matters which have now, however, been successfully overcome. In common with many other fishes, the Angler possesses the power of assimilating its colour to the nature of its surroundings. Placed on shingle, it retained a darkly spotted appearance, which disappeared on its removal to a more spacious tank thickly strewn with sand; it then quickly buried itself in the sand, assumed a pale colour, and was

hardly distinguishable from it. A third change, to a dark bluish tint, is perceptible when it lies near the mussels placed in the tank to clear the water. About a week after its capture it was induced to feed, and for some time partook freely of small plaice, bass, and gurnards. A little while back it refused food for some weeks, until a fortunate catch of live herrings furnished a change of diet tempting to its dainty palate. They were at once placed in the tank, and the Angler almost immediately commenced to ply his rod and line vigorously, was soon rewarded with a "bite," and the unwary herrings disappeared in rapid succession. A supply of whiting, plaice, gurnards, grey mullet, and herring, is now regularly placed at its disposal.

The Angler, or fishing frog, is also called wide-gab, frog-fish, and sea-devil. It is a sluggish, slow-breathing fish, generally lying almost motionless at the bottom, and rising but rarely to the surface. The breadth of the body is disproportioned to its length, and the head is large, the mouth exceedingly capacious, and thickly set with minute finely-serrated conical teeth, in addition to the palatal ones; the eyes are large, beautifully bright, and capable of separate movement. The Angler is obviously unfitted, from the unwieldy nature of its body, for the swift pursuit of its living prey, and is, therefore, compelled to resort to artifice. Among the most noticeable of its many peculiarities, the two long, thin filaments affixed to the top of the head are very remarkable. These generally lie out of sight, but, controlled by special muscles, are susceptible of pliant movement, possessing great freedom of action. When desirous of ensnaring the fishes on which it feeds, the Angler elevates these filaments and waves them to and fro in a very energetic fashion. The

victims, attracted by the flag, or bait, affixed to the end of the fishing-rod, come within reach of the monstrous wide-gaping jaws, and are speedily seized with one quick upward movement. The head is peculiar, and so jointed to the vertebrae that it is capable of independent action, whilst the body of the fish lies almost motionless. Mr. Farrell states that "they stir up the mud and sand with the pectoral and ventral fins," but this movement has not been observed in the specimen under notice, which appears to conceal its presence as much as possible, lying perfectly still in the same position for many hours, and endeavouring to attract the fishes solely by the action of the fishing-rod. In the deep-sea forms "the fly" was luminous and phosphorescent, and was thus rendered visible to the neighbouring fishes in the dim obscurity of the abyssal ocean depths. Many of the

deep-sea fishes and crustaceans also emit a pale phosphorescent light, and, illumined in the darkness, are enabled to prey on each other, a marvellous instance of adaptation to natural surroundings.

The John Dorey (*Zeus faber*), like the Angler, is also somewhat of a rarity in captivity, but the specimens exhibited in this Aquarium continue to thrive admirably, feeding on the shoals of live sprats and sand smelts sharing their abode. All the tanks, well stocked with healthy inmates, are in excellent order, testifying conclusively to the efficient care and attention of Mr. Lawler, resident curator and naturalist. The sea-lions (*Otaria Stelleri*) are again on view, the lioness having completely recovered from her late serious indisposition. Two young female seals (*Phoca vitulina*) now share the new seal-pond in the conservatory with the two males of the same species, old inhabitants of the Aquarium. A fine specimen of the curious Japanese Salamander (*Triton Sieboldi*), measuring nearly 3 feet, has recently been added to the collections. It is thoroughly acclimatized, existing in fresh water at a normal temperature, and feeding principally on raw beef and liver, which it seems to prefer to the species of fresh-water fishes offered alike for its acceptance. It is a sluggish, weak-limbed reptile, covered with a dark-brown skin, the head and throat being thickly dotted with the glands so characteristic of the "warty newts," and the large pores serving to distribute the viscous matter shed over its exterior are distinctly visible. The mouth is remarkably capacious, and the eyes so minute and dull as to be hardly perceptible. Representatives of the genus were first brought to Europe by Dr. Von Siebold, who discovered them inhabiting a lake on the top of a basaltic mountain in Japan. It is the *Sieboldia gigantea*, Bonap., and the *Salamandra maxima*, Schelegel, but is now classed with the *Tritons*, and bears a close resemblance to the gigantic American newt (*Menopoma*) of the Alleghany mountains, the generic difference consisting chiefly in the permanence of the gill-slits in the one form, and their disappearance in the adult Japanese species. It is also interesting as being nearly allied to the huge fossil salamander (*Andrias Scheuchzeri*), from the fresh-water Miocene beds of Eningen, in Switzerland, so famous as the "*Homo diluvii testis*" of Scheuchzer, who long maintained it to be a fossil man, and therefore an indisputable relic of the Noachian deluge. His views were put forth with such persistence as to be accepted by many naturalists, until the illustrious Cuvier finally settled the controversy. He obtained permission to remove the matrix, and having previously made a rough sketch of the animal he expected to find, proceeded to lay bare some hidden portions of the specimen, and thus irrefutably proved, in the presence of a group of astonished spectators, that the much-vaunted fossil-man was merely a gigantic salamander.

A. CRANE.

THE HABITS, FOOD, AND USES OF THE EARTHWORM.—No. II.

BY PROFESSOR PALEY, M.A.

1. **I**N the first place, they bring up fresh under-earth to the roots of the grass: this useful office is done on a much larger scale by moles, which live on worms, and throw up those heaps of well-crumbed mould which are intended to relieve at intervals their tunnels, made a few inches below the sod. We know that farmers, who generally dislike what they regard as superfluous trouble, and rarely possess much scientific information, will pay a mole-catcher considerable sums for the destruction of this harmless and even useful creature, which they seem to regard as a kind of rat! If they would pay a tenth part of the money to send into a meadow a small boy with a small rake, and get the mole-heaps spread over the grass, they would get a third more in their crop of hay.

2. All grazing animals eat a great quantity of earth. They cannot avoid swallowing the worm-casts, and they like to do so. Earth seems comfortable to their insides, and it is certain that they enjoy it. I used to ride a horse which, being regularly fed on hay and corn, and not turned out to grass, pined for a little dirt. Finding out this, I sometimes let him go to a hedge-bank, slackened the rein, and watched him scoop out with his tongue earth enough to fill a pint-pot. This, I think, is the reason why a horse so often stirs up the mud in a pond with his hoof before drinking. Many horses will paw the water even when passing a clear stream, giving their riders the fear that they want to lie down in it. Some races of American Red Indians eat earth. The fact is attested by Humboldt and others. It is said that the Jamaica negroes will do this when other food is deficient or not procurable.*

3. Seeds of trees are dragged by worms into their holes, and there germinate. This is most commonly the case with the seeds of the ash and the sycamore, both of which have their winged appendages set slightly on one side, like the sails of a windmill, or the screw-propeller of a ship, so that they are carried by the wind and fall aslant at some distance from the trees. I have repeatedly drawn both of these seeds out of worm-holes, after they had begun to germinate. The fact is established by the carrying down of seeds, strewed on the surface, by worms kept in a pot. There can be no doubt, therefore, that it is one of the provisions of nature for the propagation of vegetable life.

If you examine a worm-cast, you will find that it is composed partly of the earth ejected from the hole, in small clods, slightly coherent (probably from some admixture of the slime), and partly of excrementitious matter. The latter is easily distinguished by its

* See "Races of Mankind," by Robert Brown, vol. i. p. 290.

granular and mammillated appearance, somewhat resembling mouse-dirt. It does not seem to be thrown out of the hole mixed with the rest of the earth, but it is deposited separately, often in considerable quantity. If you crumble it when dry, you will find it full of vegetable fibre, which has the appearance of undigested moss, or small blades of dried grass, curiously rolled up in rather hard little pellets, which do not easily crumble with the rest of the earthy excreta. It is clear, therefore, that the dirt of the lob-worm is part vegetable, though the greater part of it is simply earth. If the excreta are dissolved in water, the vegetable *debris* is still more easily collected on the top of the muddy sediment. It is not surprising, from the nature of their food, that the richest earth is generally most full of worms. They are scarcely ever found in digging in sand or gravel, and this is the reason why you so rarely meet with mole-hills in sandy or pebbly soil; viz., because these clever little creatures find out that worms are not to be had there for their trouble in boring. How the worm ejects these little pellets on the outside it is perhaps impossible to say. The head is always protruded first from the hole; can it be that the pellets, after being discharged, are conveyed to the surface by some special process? Or does the worm emerge entirely from its hole during the night? The excreta, however, are never found apart from the worm-cast covering the hole.

I enclosed three large worms in a flower-pot of moist earth, covering it so as to prevent their escape, and occasionally sprinkling a little water on the surface. I found, as I had expected, the next morning that a hole had been bored, opening to the surface, and the bits of earth were thrown out, but not a particle of the excreta. I then placed some leaves, with bits of stick and string, on the surface of the pot, in order to see if they would be used as a plug for the hole.

I was desirous also to ascertain if the worm came to the surface to feed, or if it in any way disturbed or fed on the leaves, the positions of which and their condition I took note of. I found that the bits of string and the leaves had been all moved, and some of them drawn into the aperture of holes they had opened against the *sides* of the pot; also that the leaves were in part nibbled away, if one may use such a term of a creature which has only some power of sucking up or sucking off. It seems certain then that worms swallow both earth (rich earth in preference to poor or sandy earth) and *also* fibrous vegetable matter.

Every effect that the worm leaves visible on the surface seems done at a time when its enemies, the birds, are not abroad. How a blind creature can tell night from day seems surprising; possibly the warmth of the sun, or the dew at night may serve it for this end. By keeping one or two worms in a flower-pot, I once or twice found one partly exposed. It was

passing, by peculiar jerks made, with intervals of rest, from one hole into another. From this I suspected that, as in a rabbit-warren, the same creature has several holes communicating with each other underground.

To ascertain this, after keeping the worms for some time in a flower-pot, I let them escape, and by drying the earth I was able to dissect it so as to expose all the galleries and passages. I found these very numerous, and towards the bottom of the pot containing portions of leaves which had been drawn down for food. Grains of wheat and other seeds had been carried down to the bottom, and it seemed to me that the worms had fed on the tangled roots which these seeds had sent out through the whole thickness of the earth. The *excreta* in some cases were adhering to the sides of the pot. I think they must have some way of conveying it or pushing it out of their holes, as birds are said to eject the dirt of the young nestlings. I think, also, that it is got rid of as soon as deposited. For, though worms are very shy of making themselves visible by day, it is common to find worm-casts so moist and fresh that they have evidently just been thrown up. This is the case with mole-heaps; but I never saw, and I never met with any one who could say that he had seen, the earth actually being thrown up. The mole, like the worm, is evidently very sensitive to the tread of a foot. Both remain quiet when they feel the vibration of the ground.

Worms by no means invariably draw into their holes leaves or bits of sticks, or cover them over with pebbles. The reason of their doing so at all is therefore the more obscure, since it is not a necessity. Very often the hole is marked only by the little heaps of earthy *excreta*, and however carefully you remove these, you will find the hole itself is completely stopped. They nibble off the ends first, and then pull the remainder down lower, till little more than the stalk and mid-rib is left. And a little observation will show that the leaves have really been devoured, and have not rotted away in the moist earth. This fact I ascertained to a positive certainty by repeated supplies of dry leaves put into the flower-pot, the whole being clean eaten up except short portions of the stalks. It seems then that a very large part of the decaying vegetable matter in gardens is consumed by the numerous lob-worms, for they are greedy eaters, though they seem to do no harm to growing plants, even if they do eat some of the fibrous roots. In this respect the worm resembles the mole and the dung-beetle, which never leave the hole to the upper surface open to the air, as most of the burrowing animals do.

Nevertheless, it is certain that worms do feed on leaves or bits of stick drawn into their holes. My grass-plot in late autumn quite bristled with the tufts of fallen willow-leaves (the weeping willow), but in a few weeks they had vanished, entirely consumed by

the worms, which had drawn them there for food. I laid about a dozen of these dead willow-leaves on the top of my flower-pot, and in a day or two they were all drawn in (always with the stalk uppermost), and so gradually devoured. I put in a fresh supply, and one evening, on gently removing the cover, I detected a worm with its head affixed, or stuck by the slime, to one of the leaves. It did not stir in the least, and seemed perplexed by the stalk of the leaf resting against the side of the pot. But in the morning the clever creature had turned it round, and there was the stalk-end sticking up in the worm hole! It had turned it completely round, and whereas it had lain like a bar across the hole, it had contrived to pull in the narrow end. All this is evidently done by the creature *feeling* the position of the leaf. But to turn it when it is the wrong way is a process that resembles a kind of low reasoning rather than mere instinct—if, indeed, we have any right to regard the two motives of action as essentially distinct.*

Not only leaves were thus drawn in and devoured, but grains of wheat, canary, and rape-seed, sprinkled on the top of the earth in the flower-pot, were gradually carried down, and soon entirely disappeared, so that after a few days not a single seed was to be seen. I tried bits of stick, bread-crumbs, scraps of ginger-bread, and biscuit, but they were not much noticed, though the sticks were generally moved. After a few days, the seeds came up, thus affording a pretty conclusive proof that one province or function of the earth-worm is to promote the growth of plants by burying seed which might otherwise perish, or be picked up by birds.

In the above purely popular account of the earth-worm, no attempt has been made at a scientific description.

The anatomy of the earth-worm, and the organs and process of reproduction, which are extremely curious, are very fully explained in an elaborate paper by Sir Everard Home, Bart., in the "Philosophical Transactions of the Royal Society" for 1823, part 1, pp. 140—151, illustrated by four plates, xvi.—xix., containing magnified diagrams of the various internal parts. † These are, to enumerate them briefly, a head with a distinct mouth, having some serrated apparatus, not very unlike teeth, a brain (cerebral ganglia), spinal cord, artery, with six lateral lobes or cells on each side, containing red blood, perhaps equivalent to a series of hearts, an œsophagus, crop, gizzard, intestinal canal, and anal aperture. The creature is divided through its entire length into compartments, containing eggs enclosed in membranous

bags. Near the middle is a thick swollen ring* of rather darker colour. This is connected with the generative process, and appears to have given rise to the popular opinion that a worm cut in two will "mend itself," or grow into two worms. The roughness which is felt on handling a worm arises from minute bristles which grow out of the rings, and doubtless assist the creature in its movements. The slime exuded is not nearly so tenacious as that of the snail or the slug, but it probably facilitates the progress of the worm through its labyrinthine home, and it appears to impart some solidity both to the walls of the passages and to the substance of the *excreta*.

THE DEVELOPMENT OF SPECIALLY ADAPTIVE APPLIANCES IN PLANTS.

THERE is perhaps no branch of scientific knowledge which has received greater stimulus of late years than that part of physiological botany which

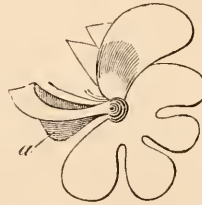


Fig. 104. Flower showing stamens in juxtaposition with style in keeled lip *a* (nat. size).



Fig. 105. Flower showing the deeply-cut petals (nat. size).

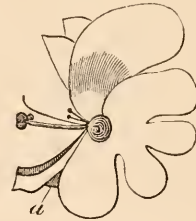


Fig. 106. Flower showing the dropped keel *a* (nat. size).

refers to the colours of flowers and the origin of their forms. The observations of Drs. Darwin and Müller, of Sir John Lubbock, and others, have supplied material for modern scientific thought to explain the whole scheme of vegetable creation, and attempt is now even being made by some to connect with the development of vegetable life the colour sense of the animal world, including that of man himself.

A writer in *Cornhill Magazine* for May has striven to show that all irregular-shaped flowers, especially those which combine with colour attractive-

* Sir Emerson Tennent, in his "Natural History of Ceylon," p. 90, relates, as a singular instance of the sagacity of an elephant, his turning sideways a log, which he was carrying balanced across his tusks, so as more easily to make his way through the trees.

† See also Dr. Nicholson's "Manual of Zoology," p. 209, ed. 3, and especially Prof. Huxley's "Manual of the Anatomy of Invertebrated Animals," pp. 219—226.

* In a full-grown worm, a part of the body into which more or fewer of the segments between the twenty-fourth and thirty-sixth inclusively enter, is swollen, of a different colour from the rest, provided with abundant cutaneous glands, and receives the name of *cingulum* or *clitellum*.—Huxley, p. 221.

ness, sweet-scentedness, such as the *Labiata*, are the most recently evolved, and that with this development have been correlated the colours of insects. Also similarly is it so in the case of coloured fleshy fruits and the development of the colour sense in the higher vertebrates to suit their frugivorous tastes. And it is interesting to remark that these higher stages have been observed to be intensified even in historic times, as in the case of the human race; for the mere mention of colour itself—that is to say, in any sense of appreciation—is entirely absent from the most ancient literary works which we possess.

and also of both colour and the colour sense in the vegetable and the animal world.*

A recent observation of my own upon a member of the *Scrophularineæ* led me to the idea of communicating the foregoing remarks as introductory to those I am about to make in reference to the development of floral adaptations in relation to fertilization.

Unquestionably the prime important function of life, both vegetable and animal, is the securing of means for perpetuating its existence, but in an improved direction. Therefore, if in the former division of the organic world any usual acquisition be



Fig. 107. Raceme of *Schizanthus papilionaceus* (nat. size).

These views may be looked upon as more or less fanciful, but nevertheless it is difficult to say they are vain speculations, and they combine, moreover, to harmonize with other great principles of evolution already propounded. But I will not dwell upon this theme here, pregnant as it is with fascination and interest. Readers of SCIENCE-GOSSIP will find elsewhere matter which sets forth the views affecting the development of flowers, constituting the Phanerogams,

occasionally wanting pertaining to these means for reproduction, it often happens that some organ or organs is or are so modified as to supersede that inconvenience. For instance, the plant *Ajuga ophrydis*, of South Africa, has flowers much resembling those

* Vide "The Colours of Animals and Plants," by Alfred R. Wallace, in *Macmillan's Magazine* for September and October, 1877; "The Origin of Flowers," in the *Cornhill Magazine* for May, 1878; and J. E. Taylor's recently-published "Flowers: their Shapes, Perfumes, and Colours."

of an orchid, and it has been suggested that this acquirement may have been a necessary modification, in order to assist, by its assumed attractive power, in the means for fertilization, in the absence of some other alluring property, such as nectar; and, as Mr. Wallace adds, the supposition is rendered all the more probable considering that this is the only species of the genus in South Africa.

I may now be permitted to call attention, for the first time, I believe, to the special adaptations for cross-fertilization in another irregular-flowered species, viz., *Schizanthus papilionaceus*, alluded to above. This plant belongs to the sub-order *Salpiglossideæ* of *Scrophularineæ* (according to Bentham), forming an intermediate section towards which the Figworts and Nightshades approach each other. The inflorescence of *Salpiglossideæ* differs from the other two sub-orders of the order in being entirely definite or centrifugal. The plant here mentioned formed one of the two subjects selected by the Science and Art Department for diagnosis in the "Honours" grade in Botany this year; and there cannot be two opinions that the corolla, which makes the flower so conspicuous and handsome, is particularly easy to describe. The inflorescence is a large loose panicle, or, as it is definite, it may perhaps be more properly defined as consisting of true racemes, arranged upon a loosely-branched floral axis: the individual flowers are somewhat papilionaceous, as its specific name indicates, or rather more correctly termed, perhaps, papilionaceolabrate, the upper or posterior portion of the limb being perfectly erect, whilst the lower anterior, which is three-lobed, forms a horizontal "keel," in which are the two long perfect stamens (fig. 104). The petals of the combined whorl are more or less deeply cut (fig. 105); hence the signification in the prefix to the generic name. Similarly we have it in corolla and name in *Schizopetalon* belonging to the cruciferous order. The lovely flowers of *Schizanthus papilionaceus* strike one for the first moment as those of an orchidaceous plant, and doubtless the cause of such a development has a similar purpose to fulfil as that of *Ajuga ophrydis* and other peculiarly abnormal corolline forms.

Now it will be seen that the position of the two perfect stamens in the keeled lip are in juxtaposition with the style (fig. 104). But the extreme condition of proterandrisms appears to prevent self-fertilization, whilst another attendant condition in the way of insect adaptability must evidently favour cross-fertilization. This lower keeled portion of the limb is, as I pointed out before, horizontal. When the plant was first brought under my notice, I observed that whilst the two developed stamens in some cases had closely approached the style, the "keel" of those particular flowers had dropped down (fig. 106). I also observed that the anthers in those instances had discharged their pollen; in other words, they had finished their work. Not dreaming of such a thing

as inherent irritability, I merely shook the flower-stalk, with its numerous flowers, violently in my hand, to notice if motion had anything to do with the bringing about this changed position of keel and stamens. All remained the same, and so at present did the mystery. My books at home afforded me no help, neither did persons of whom I sought information, until I reached a professional gardener, and seedsman,* an old acquaintance, of some half a dozen miles distant, who, to my utter astonishment, was cultivating *Schizanthus papilionaceus* in pots for the conservatory in abundance! It was an exquisite floral sight. Having this further opportunity, I examined the flowers again. The "keel" of one of them was slightly touched when we perceived that the two stamens instantly jerked upwards out of it, and closely approached the style; at the same time the anther-cells burst, expelling the profuse pollen with great elastic force; simultaneously also the "keel" dropped down as if upon a hinge.

The problem was now fully solved, and there remains but little for me to add. The points of consideration in the flowers of this plant as affecting a condition opposed to self-fertilization may be summarized as follows:—(1.) By the unequal development of the stamens and pistil (proterandrisms). (2.) By the existence of a large area of attractiveness provided by the combined numerously flowered inflorescence, and peculiar structure of the individual flowers. (3.) By the need of mechanical stimulus to disturb the concealed perfect stamens.

The "keel" forms an alighting stage for the insect, which swings down under the weight of its body, and, especially its underside, becomes at the same time dusted over by the discharged pollen. As the position of the style is parallel with and close to the upper side of the "keel," the insect's body would naturally come first in contact with the stigma of any foreign flower the insect may visit, and if the stigma be in a state far enough advanced, fertilization would be effected. Probably no plant, orchids excepted, affords a more interesting subject for study and such combined appliances, emphatically promoting the end which incontestably supports the Darwinian view that "Nature abhors perpetual self-fertilization."

Slough.

GEORGE NEWLYN.

P.S.—Since the above has been in type, the Rev. G. Henslow has kindly communicated to me some interesting details of similar observations he has made in the floral structure of a few leguminous plants.—G. N.

HOW TO DESTROY ANTS.—If Mr. George Pearce uses a mixture in equal parts of calomel and powdered white sugar, he will speedily rid himself of the ant nuisance.—*Samuel Woods.*

* Mr. Elliott, of Bray Wick, Maidenhead, who informed me that *S. pinnatus* was very similar to *S. papilionaceus*, both in the structure of the flower and habit of growth.—G. N.

BOTANICAL WORK FOR JULY.

SUPPOSE any one absent from England for many years, were to be landed, or placed on our shores about the early part of summer, but to be totally ignorant as to the month of the year, rambling along the lanes and fields, and seeing a profusion of the various though elegant species of *Veronica*, he would naturally say, "This must be the month of May!" So, in like manner, a little later in the season, finding the willow-herbs scattered here and there with a lavish hand—would he not exclaim: "This is July!"?

Our subject this month then must be to work up the willow-herbs. We trust we shall make them so simple and plain, that our meaning or descriptions cannot be misunderstood, but make a large addition of new forms to our herbaria of curious and distinct varieties, which have hitherto been passed over:—

SECTION 1. *Corolla irregular, wheel-shaped (rotate).*

In this section we have only one British species, the handsome Rose-bay, *Epilobium angustifolium*, Linn., with its garden variety, *E. brachycarpum*, Leight.

SECTION 2. *Flowers regular, campanulate, or funnel-shaped.*

Note.—By carefully observing the characters of the following *divisions*, it will be easy afterwards to recognize the different species and varieties, without having the least doubt as to their identity.

DIVISION 1. *Stems terete, stigma 4-cleft.*

1. *Epilobium hirsutum*, Linn. Whole plant very hairy. *L. opposite, oblong-lanceolate*; flowers large, showy, rose-purple, often $\frac{3}{4}$ in. diameter; the four lobes of the *stigma* curled backwards (revolute); buds erect.

2. *E. parviflorum*, Schreb. (*E. molle*, Lam., in Fl. des Environs de Paris). A much smaller plant than No. 1. *Stigma* lobes short, not bent back; *L. alternate*; flowers $\frac{1}{2}$ in. diameter, rose-purple, more or less pubescent.

Var. *a. E. rivulare*, Wahl. Often quite glabrous or smooth; not unfrequent on the borders of shallow brooks.

Var. *b. E. intermedium*, Merat. Covered with fine silky hairs. *L. all alternate*. Frequent by stagnant ponds, &c.

Var. *c. E. molle*, pubescent. *L. in threes, verticillate* (whorled); more rare than the above. By the river at Kew.

3. *E. montanum*, Linn. *L. quite smooth*, except veins, oblong-ovate; buds drooping; flowers pale purple.

Var. *a. E. gracile* (Fl. des Environs de Paris). A smaller plant, and much branched. *L. oblong*, on short stalks; flowers all drooping gracefully.

Var. *b. E. verticillatum*, Thuret. *L. small, whorled* in the lower part of the stem.

Another variety, though probably not a permanent one, with white flowers, is occasionally found in plantations.

4. *E. lanceolatum*, Sebast. Very rare. *L. stalked, lanceolate*, narrowed to an entire base; buds drooping, ovate.

DIVISION 2. *Stem with raised lines, or 2 to 4 angles, stigma entire, club-shaped.*

5. *E. tetragonum*, Linn. Stem with 4 unequal angles; *L. strap-shaped*, smooth, stalkless; buds erect. A much-branched species.

Var. *a. E. obscurum*, Schreb. *L. tapering* from a rounded base, lanceolate, not shining above. We regard this as a true species, as do most continental authorities. (Vide Gren and Godron.)

6. *E. palustre*, Linn. Stem 1 foot, simple, with 2 lines of hairs, seldom branched. *L. mostly opposite, downy* on upper surface, smooth beneath, except midrib, lanceolate, with wedge-shaped base. Flowers small, in leafy clusters.

Var. *a. E. pubescens*, Cuss. Whole plant covered with downy hairs, and densely branched.

Var. *b. E. ligulatum*, Baker. *L. toothed*; style simple; partakes much of the characters of *palustre*.

In this month we must also keep a look-out for the Loosestrife, *Lythrum Salicaria*, Linn. Being so well known, it is not needful to describe it particularly; first, let us observe, Hooker, in "Student's Flora," notices two varieties growing by the Thames, at Kew,—a long-styled and short-styled plant. These have recently attracted considerable attention, by observers of the modes of fertilization, and justly so, for, even viewed in this light, they are full of instruction.

In the Floras of France, three varieties are enumerated. Having occasionally detected these, we mention them with confidence,—it may throw a new charm upon an old face to many of our readers.

1. *L. alternifolium*. Floral leaves alternate (rarement toutes les feuilles alternes—Fl. des Environs de Paris). We have not seen the whole of the leaves alternate; as here described. Flowers pink.

2. *L. verticillatum*. *L. in threes, verticillate, styles long*. A smooth plant, slender, with narrow leaves. Flowers bright or pale pink.

3. *L. pubescens*. Style short, a large coarse plant. Flowers dark dull-purple, very hairy (Plante très-pubescente, or plant very pubescent). Fl. des Environs de Paris.

The Sundews (*Drosera*) are becoming just now so conspicuous that we may be pardoned by a passing though brief reference to one of the species. Probably *Drosera obovata* (Mert. et Koch) has hitherto attracted very little attention, from the fact, it is supposed to be a hybrid betwixt *D. anglica* and *D. rotundifolia*, but any one knowing the true plant, and observing its habit, style, and capsule carefully, will never so regard it.

D. obovata, Mert. and Koch. *L. truly obovate*,

broader at the summit than the type. Style *notched*, capsule *half as long* as the sepals.

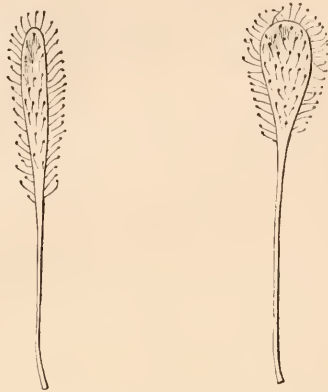


Fig. 108. Leaf of *Drosera anglica*. Fig. 109. Leaf of *Drosera obovata*.

We give an engraving of the leaves, natural size, of both the type and variety; this may help in its identification.

F.

MICROSCOPY.

DIATOMACEOUS MATERIAL.—Mr. Clark, the Secretary of the San Francisco Microscopical Society, announces to diatomists that the Society is now enabled, by the kindness of the State Geological Survey, to offer return exchanges of the Pacific Coast diatomaceous deposits *on receipt* of any valuable microscopical material.

THE QUEKETT MICROSCOPICAL CLUB.—We have received the latest issue of the Journal of this vigorous society, containing a description by Mr. J. G. Waller, of a new British sponge, of the genus *Microcionia*; a paper on "The New Autographic Process," by Mr. A. Cottam; an abstract contribution by M. M. Hartog, B.Sc., on "The Investigation of Floral Development"; and a "Record of the Proceedings of the Meetings of the Club."

A WET PROCESS OF MOUNTING in balsam is well described by Mr. Stokes, in the May number. I have for some years used a similar method, and which for large and whole insect preparations I prefer. It is difficult to set out all parts of an insect, and at once apply balsam without again disarranging your work. I therefore proceed thus:—The object having been sufficiently soaked in potass to soften it, and washed well in distilled water and freed from dirt, &c., I place it for a minute or two in alcohol, then lay it out on a piece of glass in a little alcohol, cover with another piece, press and tie with cotton, and throw into a bottle of alcohol—the longer it stays here the less likely to alter form,—take it out after a day or two, put into

turpentine and again brush; it may be then mounted after a few minutes' soaking in the turpentine, but I generally prefer to tie it up again and throw it into turpentine for a few days. To mount, lay object on slide on some balsam (liberally), and cover with thin glass, which hold down lightly with clip of some kind; boil, until a portion of the balsam around the cover, taken on the end of a needle, is tolerably stiff. There may be very many bubbles, but if they only arise from vapour of turpentine, and the balsam is not too hard, they will all go out in a few days. The boiling need be for a very short time, and a little practice will make perfect work. It is the simplest method of balsaming I know of, much more easily managed than damar.—*An Old Mounter*.

CANADA BALSAM IN INDIA.—An experience of twenty years enables me to give a satisfactory answer to the inquiry of H. F. Blackett as to the heat-resisting power of Canada balsam in India. I have brought back with me many specimens, mounted in that medium, which I took out with me twenty-five years ago, and they are as perfect as ever they were. My experience of mounted slides is as follows, though it may possibly not accord with that of others. Canada balsam stands well, and so (and I was much surprised at the fact) does sealing-wax varnish as a surrounding cement; though much, no doubt, depends upon the quality of the sealing-wax. The black asphalt cement is apt to run in under the thin glass. I have some specimens surrounded with this material entirely spoilt, while a few have stood well. All chemical preparations are spoiled by the climate.—*C. S. P. Parish*.

PLANT-CRYSTALS.—Mr. Hammond's paper, in the June number of SCIENCE-GOSSIP is likely to lead to valuable microscopical work. Now, microscopists need no longer be advertising for good materials for the preparation of interesting slides, for they everywhere surround us, in our walks through the green lanes and excursions to the conservatory, and to the shops of the druggists. In the latter may always be had guaiacum bark and quillaja, in both of which the long crystal prisms exist in great abundance and beauty; while the short prismatic crystals are very plentiful in most of such common plants as the Leguminosæ, and in the testa or seed-skin in the Elm, Black Bryony, and Scarlet Pimpernel. All these crystals are admirably fitted for experiments on the polarization of light. The sarsaparilla of the druggists affords true raphides; but these do not polarize light well, nor do the cystoliths or other sphaeraphides. All of them are figured either in SCIENCE-GOSSIP, May, 1875, or in the *Monthly Microscopical Journal*, December, 1873; and it is understood that Professor Lionel Beale will devote two plates to all these interesting crystals in the forthcoming new edition of his great work, entitled "How to Work with the Microscope."—*G. R.*

ZOOLOGY.

THE HEMIPTEROUS FAUNA OF ST. HELENA.—At a recent meeting of the Zoological Society of London, a communication was read from Dr. F. Buchanan White, entitled "Contributions to a Knowledge of the Hemipterous Fauna of St. Helena, and speculations on its origin." In the first part of his paper the author, after briefly noticing what was known with regard to the Fauna and Flora of that remote and interesting oceanic island, and mentioning the various theories that had been brought forward to account for their origin, discussed the difficulties of the animals, and argued that they had evidently been derived at a remote period from the Palearctic Region by way of Madeira, the Canaries, and the Cape de Verde Archipelago. In the second part of his communication Dr. White described the Hemiptera collected in St. Helena by the late Mr. T. V. Wollaston, during the recent visit of that naturalist to the island. The collection included thirty species, of which five were probably introduced; one appeared to be indigenous, but seemed identical with European species; and the remaining twenty-four were regarded by the author as new and peculiar to the island. Seven new genera and one new sub-genus were created for the reception of ten of the species, the rest, with one exception, being referred to European genera.

TESTACELLA HALIOTOIDEA IN JERSEY.—This slug, though recorded as occurring in the sister isle of Guernsey, seems not to have been reported from this island. On the 21st of April last, about 9 a.m., I observed a specimen crawling at the foot of a dry bank, after rain. It carried a prominent oval laminated shell, of an ashy-white colour, about $\frac{1}{2}$ an inch in length by $\frac{1}{4}$ of an inch in breadth, just in front of the hinder extremity. But it appears that an intelligent observer, R. Macdonnell, Esq., by whose kindness I have since seen a second specimen, has noticed it occasionally, for several years, in his garden, about half a mile from the other locality. Whether it is indigenous in Jersey, or imported from France with soil, I must leave to those who, unlike myself, are learned in the history of mollusca.—*Martin M. Bull, Jersey.*

THE CUCKOO AT NIGHT.—On the 24th of May I heard the note of the cuckoo at 2:15 a.m. The night was very dark, and it was raining heavily, yet the cuckoo was singing as loud and as cheerfully as it would in the daytime. Is it usual for the cuckoo to sing during the night?—*A. M. McA., Stoke-on-Trent.*

IRISH WOLF-DOG.—Lord Talbot of Malahide formerly had a dog said to be the Irish Wolf-dog; he probably can give "L.M." the information he requires.

BOTANY.

MEYENIA ERRECTA.—It must have been obvious to SCIENCE-GOSSIP readers that the name "Mergenia erecta," which headed a paragraph in the June number, page 139, and which had reference to fertilization adaptability, was a misprint for the above. Acanthaceæ, to which natural order this plant belongs, approach Labiate and Verbenaceæ, Scrophularinæ and Bignoniaceæ in the irregular anisotemenous corolla: they differ from the latter two orders in the æstivation of this whorl, and by the absence of albumen. All these groups of irregular-shaped flowers are specially adapted for insect fertilization, and, as regards the favoured theory of the origin of species, they doubtless constitute the last link in the developed series of flowering plants. I am inclined to suggest that there is a field open in connection with the investigation and study of the floral structure of these groups, and that special attention devoted in this direction will be attended with fresh interesting discoveries.—*George Newlyn.*

EPILOBIUM ANGUSTIFOLIUM (Rose-bay Willow-herb). In "Flora Lapponica," Linnæus describes the hut of the Laplander encircled with the tall stems and elegant blossoms of this species; he goes on to state they in state emulate the palaces of the gods. The Swedes call it *Himmelgras*, or "herb of heaven." The only true wild form found in England is the *E. macrocarpum*, Steph., whilst the one often found in cottage-gardens is the *E. brachycarpum* of Leighton's "Fl. Shropshire"; they are quite distinct.—*R.*

DESTRUCTION OF RARE PLANTS.—As this sad work is still going on, Mr. E. D. Marquand deserves the thanks of all botanists for his judicious remonstrances, in the June number of SCIENCE-GOSSIP, against the rooting out of the New Forest such interesting species as *Spiranthes æstivalis* and *Pulmonaria angustifolia*. It would be a libel to attribute such wanton destruction to botanists, since it is done by mean dealers. But it unfortunately happens that the destruction is too often encouraged under the pretence of science, especially by some of our provincial societies offering rewards for the best collections, as if mere collectors had any pretence to be regarded as botanists or zoologists. If the rulers of such societies had any intention of encouraging, by rewards of money or otherwise, the promotion of botanical or zoological science, that might be more easily and effectually done by proposing investigations of the species and intimate structure of common plants and animals. For example, the species of the Wild Roses, Brambles, Willows, Sedges, Grasses, &c., would afford excellent exercises; and so would the examination of the intimate structure of the glands, hairs, pollen, and distribution and significance of raphides and other plant-crystals, &c. It is really

aggravating that Mr. Marquand should have been called on to protest now against a crying evil; especially as it has long since been denounced by Professor Gulliver and others in *Nature*, May 22, 1873, and in the Nineteenth Report of the East Kent Natural History Society; and all this about the same time that Professor Babington and other eminent botanists were protesting strongly but ineffectually in the same cause.—*Q. F.*

A GLASS-EATING LICHEN.—My friend Mr. Johnston-Lavis's lichen seems probably of more interest than the unpainted surface of much old glass. If this lichen—for lichen it very probably is—really has the power of dissolving glass, it is certainly of the very deepest interest. I quite agree with the discoverer in setting aside the "workman" theory; but I much regret that the extent to which the figures are magnified is not given, the method of drawing not stated, and the "various re-agents" used to remove the growth not named; for in Mr. Johnston-Lavis's paper I see no evidence that would make me attribute a solvent power equal to that of hydrofluoric acid, to this lichen, rather than believe in the simpler hypothesis that it is filling up by its growth previously existing holes. I hope my friend will prosecute this inquiry, and produce some more decisive evidence one way or the other.—*G. S. Boulger.*

OLD PLANT-NAMES.—In answer to Mr. Henry F. Bailey, I may say that Dittany does not occur in Turner's "Libellus de re Herbaria" (1538). In Gerard's "Catalogus" (1596), *Dictamnus creticum* and *fraxinella* are mentioned, and in the second (1599) edition, the former is called "Dittanie of Candie," and both "Fraxinella Bastard Dittanie" and "Fraxinella altera, Great Bastard Dittanie," are recorded. The *Dictamnus creticum* is described on p. 651 of Gerard's "Herbal" (1597), and is identified by my friend Mr. Benjamin Daydon Jackson, editor of the "Catalogus" and "Libellus," with *Origanum dictamnus* of Linnæus. *Fraxinella* is described on p. 1065 of the "Herbal," and is, according to the same high authority, *Dictamnus albus*, L., whilst *F. altera* is on the same page of the "Herbal," and is *Dictamnus fraxinella* of Persoon. *Dictamnus* belongs to the Rue tribe. It is remarkably inflammable, owing to its oil-secreting glands. *D. albus* is now commonly known as Dittany. *Origanum* belongs to the Labiatae, and our Marjoram is a species of this genus. On p. 61 of the "Herbal," and in both editions of the "Catalogus," Gerard also mentions "Pseudodictamnus, Bastard Dittanie," which Mr. Jackson makes *Ballota pseudo-dictamnus* of Bentham. Garden Rue is, and was in Gerard's time, *Ruta graveolens*, though then known as *Ruta sativa*. I am not at all sure about the Mandrake, but the probabilities seem in favour of a solanaceous plant, rather than the White Bryony, which is the popular name by which

Bryonia dioica is distinguished from *Tamus communis*, the Black Bryony. Tournefort named the genus of Solanaceæ, now known as Mandragora, of which the species *officinalis* is commonly known as the Mandrake, "The insane root which takes the reason prisoner," is often said to be the Dwale, or Deadly Nightshade (*Atropa Belladonna*). I may refer Mr. Bailey to the Rev. H. N. Ellacombe's "Plantlore of Shakespere," an excellent work, which I have not by me at present, and I may perhaps also take this opportunity of calling attention to the existence of a "Turner Printing-Club" for reprinting early works on British botany, under the superintendence of Mr. B. D. Jackson, of 30, Stockwell-road, S.W. In Gerard's "Catalogus," and the "Herbal," p. 274, the Brinjal, Aubergine, or Egg-plant of Asia, *Solanum Melongena*, L., is mentioned as *Mala insana*, Mad or Raging Apples. I take this opportunity of publishing, for the justification of our early authors, their meaning in the various Maiden-hairs. The true Maidenhair is *Adiantum capillus-veneris*. Possibly the foliage of *Thalictrum minus*, the Lesser Meadow Rue, was sometimes mistaken for it. The common or English Maidenhair is *Asplenium Trichomanes*; the Black Maidenhair is *Asplenium Adiantum-nigrum*; the White Maidenhair is *Asplenium Ruta-muraria*, the Wall-rue Fern; and the Golden Maidenhair is the moss *Mnium hygrometricum*, also called Little Goldilocks. The Goldilocks is *Ranunculus auricomus*.—*G. S. Boulger.*

BIBLE PLANTS.—An interesting little volume with this title, by John Smith, ex-curator of the Royal Botanic Gardens, Kew, has just been published by Hardwicke & Bogue. One plant, however (*Lycium Europæum*), appears to me calculated to mislead; it is described (page 207) as "a rambling, prickly shrub, well known in this country as *Boxthorn* or *Tea-tree*, and often used for covering garden-seats, arbours, and the like, and is a hedge-plant in Palestine." At plate 9 is a figure of the plant, marked C, which is no doubt correct as it is found in Palestine, but bears no resemblance to the tea-plant so well known in England. Mr. Baker, curator of the Royal Herbarium at Kew, says, "it is *Lycium Barbarum* not *Europæum* that is commonly cultivated, but they are very near to one another, and the genus is in a great muddle and wants re-monographing." He says, "The *Lycium* of Syria is *L. vulgare* of Linnæus, *L. Mediterrancum* of Dunal, and copiously spiny when wild, but loses its thorns when under cultivation." The *Lycium Mediterrancum*, Dunal, D.C. Prod.; *Lycium Europæum*, Linnæus, Mant. 47; Desf. Atl.-cock syn., is described in the "Flore de France," by Grenier et Godron, as with leaves a little fleshy, oblongues-obovées, insensibly attenuate in a short petiole, common on the whole littoral of the Mediterranean. No one looking at the figure at plate 9 could suppose it represented the tea-shrub, so

well known in England. The plant is stated in the "Treasury of Botany" as being known as "the Duke of Argyle's tea-tree," the leaves being recommended for use in the place of tea, a piece of advice not generally acted upon it would seem. The leaves appear in the figure so extremely diminutive that they never could have been used as a substitute for tea. There appears, therefore, to be some confusion; the plant in the figure should have been referred to as the *Lycium Europæum* of Palestine, but altogether unlike the tea-tree, sometimes found in a semi-wild state in England, where it is so well known as the tea-tree. Mr. Baker says he has not seen the Bible plant, and of course he can give no opinion as to the figure in plate 9.—*T. B. W., Brighton.*

DEFINITE AND INDEFINITE INFLORESCENCE.—Sir J. E. Smith thought the distinction of not much importance, on account of the difference found among the species of *Allium* in the order of expansion of their flowers. Nor did Professor Lindley seem to recognize the distinction as of primary importance, for in this little work on Descriptive Botany, the spike, the raceme, and the corymb are represented by figures each terminated by a central flower. Such a central flower may indeed be found in the spike of Agrimony, the corymb of the Pear, the umbel of the Apple, and the panicle of London Pride. After noticing such facts, one may be pardoned for entertaining a doubt as to the existence of any form of inflorescence strictly indefinite, *i.e.*, incapable of producing a terminal flower on the axis of inflorescence, or a lateral bud below the flower upon its pedicel. Such a mode of inflorescence does, however, seem to be in the orders *Crucifere* and *Primulaceæ*, and it may be in other natural orders, only subject to such exceptions as belong to the province of teratology. For nearly twenty years I watched the inflorescence of cruciferous plants before finding an indisputable case of a flower-stalk with a flower on the summit and another below it on the side. This was on one of the ramifications of a much-branched stem of a perennial stock which flowered last year, and of which a note appeared in SCIENCE-GOSSIP of July, 1877. This year a similar phenomenon has appeared on another plant of the same kind. Foliar proliferation of the inflorescence is, however, much more common, though I have observed it only in perennial plants, not in annuals or biennials. The stem of the watercress will sometimes grow beyond the series of flowers on its sides, producing leaves above the raceme as freely as below it. *Cardamine pratense* may be occasionally found with a tuft of leaves on the top of a flowering stem, and I have now in bloom in my garden a stem of a wallflower which bore flowers, produced pods, and ripened seeds last year. Between the two series of flowers came a tuft of leaves, and this year there is a branch above the mortal remains of last year's pods, which, as well as the main stem, has

blooming flowers. If the stem be not exhausted too much to ripen seed, I will allow it to do so, that I may see if such a variation is hereditary. It thus appears that in cruciferous plants median proliferation of the inflorescence is always foliar, median proliferation of the flowers floral.—*John Gibbs.*

ORCHIS-HUNTING IN SURREY.—Surrey is to me associated with many delightful rambles, and none of them more so than those I have denominated "Orchis-hunting." Living at that time close upon the North Downs, I was able to make acquaintance with some of the chalk-loving species of the Orchidaceæ seldom met with now, especially as I am at present located amongst the Red Sandstone of Devonshire. My "happy hunting-grounds" at that time consisted of the parish of Ockham as a centre, from which I made pedestrian excursions into the surrounding neighbourhood. Most of the species I find referred to in my notes were found within some five or six miles of what was then Ockham Middle-Class Schools. In the moist meadows around, and up what everybody knew as the "Rides," were found very plentifully, *O. mascula*, *O. maculata*, *O. latifolia*, *Neottia Nidus-avis*, and the *Listera ovata*. (The *Adder's Tongue Fern* was very plentiful in a meadow by the side of the Rides.) In a meadow near a pond called the "Sheepwash," I came upon the *Habenaria bifolia*, and on several occasions *O. morio*. It was, however, by walking some five miles and getting upon some of the chalk ridges that I made acquaintance with some of the more strange-looking species. In the adjoining parish of East Horsley was a hilly piece of ground known as the "Sheep Leas," as far as I can remember the name. I am not sure of the orthography of the word,—I give the name as it sounded to me. This was a favourite place for a holiday of the picnic order, and our people often resorted to it in days of yore. Many a pleasant day's botanizing I have done there. It was there I made acquaintance with the *Aceras anthropophora* and the *Ophrys mucifera*. The *Ophrys apifera* I found here most plentifully distributed, in fact, almost carpeting the ground. This odd-looking Orchis I also found in great abundance in a "rough field" near the Fox, on Rammoor Common. I also remember a few being found in Ockham Park one season. As to the *O. mucifera* I think it was under the beech-trees on the Sheep Leas that I found it. In the same neighbourhood I found the *Ophrys aranifera*, and the *Orchis hircina*. I think it was in the Sheepwash meadow already mentioned that I also found the *Orchis conopsea*.—*J. Mills Higgins.*

COLIAS EDUSA.—Can any of your readers of SCIENCE-GOSSIP give me a reason for calling the clouded yellow butterfly "Colias Edusa"? "Colias" meaning a kind of tunny-fish, and "Edusa" the goddess who presides over the nourishment of children.—*Haviland.*

GEOLOGY.

THE GLACIAL PHENOMENA OF THE LONG ISLAND, OR OUTER HEBRIDES.—A paper on this subject has recently been read before the Geological Society by James Geikie, LL.D. The author gave a detailed account of the glacial phenomena of Harris and the other islands that form the southern portion of the Outer Hebrides. Evidence was adduced to show that Lewis has been glaciated from S.E. to N.W., and the shelly boulder-clays and interglacial shell-beds of that part of the Long Island were described in detail. Harris, North Uist, Benbecula, South Uist, Barra, and the other islands that go to form the chain of the Long Island were successively described under the headings of Physical Features, Geological Structure, Glaciation, Till or Boulder-clay, Erratics and perched blocks, Morainic débris and Moraines, Freshwater Lakes and Sea-lochs. Numerous bearings of stræ, which abound, were given, and these were held to prove that the whole Outer Hebrides have been glaciated by ice that flowed outwards from the mainland of Scotland. The position of abundant *roches moutonnées* points to the same conclusion, and this is still further supported by the "travel" of the Till. That deposit is generally absent or very sparingly present on the rock-faces that look towards the mainland, but it is heaped up in their rear, and spreads over the lower tracts that slope gently towards the Atlantic. On the west side of the islands not a few boulders occur in the Till, which have been derived from the east; and the same is true of certain erratics lying loose at the surface of the ground. The islands are well glaciated up to a height of 1,600 feet above the sea; and the line of demarcation between the glaciated and non-glaciated areas is extremely pronounced. Above 1,600 feet the hills show rugged, splintered, jagged, and sometimes serrated tops. The author regarded the Till or boulder-clay as the morainic material that gathered underneath the ice, and proof of this is given. Erratics and perched blocks are very numerous, and most of these, as well as much of the morainic *débris*, are believed to have been dropped where we now find them during the final melting of the ice-sheet. It was shown, however, that certain erratics and perched blocks and some well-marked moraines are due to local glaciers, as are also some of the striations in a few of the mountain valleys. The origin of the rock-basins, which are now lakes, was discussed, and attributed to the erosive action of ice. To the same cause were assigned the rock-basins which occur in certain of the sea-lochs. In concluding, the author pointed out that we may now arrive at a true estimate of the thickness attained by the ice-sheet in the north-west of Scotland. If a line be drawn from the upper limits of the glaciations in Ross-shire (3,000 feet) to a height of 1,600 feet in the Long Island, we have an incline of only 1 in 210 for the upper surface of the

ice-sheet; and of course we are able to say what thickness the ice reached in the Minch. Between the mainland and the Outer Hebrides it was as much as 3,800 feet. No boulders derived from Skye or the mainland occur in the Till of the Outer Hebrides, and this was explained by the deflection of the lower portion of the ice-sheet against the steep wall of rock that faces the Minch. The underpart of the ice that flowed across the Minch would be deflected to right and left against the inner margin of the Long Island; and the deep rock-basins that exist all along that margin are believed to have been scooped out by the grinding action of the deflected ice. Towards the north of Lewis, where the land shelves off gently into the sea, the under strata of the ice-sheet were enabled to creep up and over the district of Ness, and thus gave rise to the lower shelly boulder-clay of that neighbourhood, which contains boulders derived from the mainland. The presence of the overlying interglacial shell-beds proves a subsequent melting of the ice-sheet, and a depression of the land for at least 200 feet. The overlying shelly boulder-clay shows that the ice-sheet returned and overflowed Lewis, scooping out the older drift-beds and commingling them with its bottom moraine. The absence of kames was commented upon, and shown to be inexplicable on the assumption that such deposits are of marine origin; whilst if they be of torrential origin their absence is only what might be expected from the physical features of the islands. The only traces of post-glacial submergence are met with at merely a few feet above present high-water mark.

THE FOSSIL FUNGUS.—Too much credit cannot be given to Mr. Butterworth for his labours on fossil plants, carried on for so many years under great difficulties but with great perseverance, and with most important results. Prof. Williamson has again and again expressed his obligations to Mr. Butterworth; and the collections of the British Museum have several valuable specimens prepared by Mr. Butterworth's own hands, the importance of which I have testified to on several occasions. No doubt Mr. Butterworth observed the fossil fungus in his specimens before they were sent to London, although Mr. Smith and myself were ignorant of it. But the fungus had already been observed by myself, and shortly described from specimens in the British Museum prepared by Mr. Norman, and the interest of Mr. Butterworth's specimens to me, when they were shown me by Mr. Young, was that they confirmed the specimens I already possessed, and added to my knowledge of the fungus. The two *Palæozoic* fungi which Mr. Butterworth refers to could not include the *Neozoic* parasite in the fern-stem from Ierne Bay, as he supposes. These two *Palæozoic* fungi were—1. The curious mycelium masses found at Newcastle by Mr. Atthey, and described and figured in his "Annals and Magazine of Natural History"; and 2. The

parasite fungus in the stem of a *Lepidodendron* described by myself without a name, and afterwards, by the help of Mr. Butterworth's specimens, described at greater length by Mr. Smith.—*William Carruthers.*

THE TERTIARY FLORA OF AMERICA.—Thanks to Dr. Hayden, we have received the seventh volume of the Report of the United States Geological Survey, containing Prof. Lesquereux's "Contributions to the Fossil Flora of the Western Territories," Part II. "The Tertiary Flora." It is a large and handsome quarto volume of nearly 400 pages, and contains 65 magnificently-lithographed plates. In everything, type, lithography, quality of paper, and even binding, these publications shoot far ahead of our own "Memoirs of the Geological Survey," whose small type seems intended to deter people from reading them—a plan which is considerably aided by the extravagantly high prices charged for them! Our geologists are not particularly fortunate in the possession of large salaries, and the high price charged for their memoirs almost places them beyond the reach of ordinary readers, and thus condemns the labours of some of our ablest scientific men to an undeserved obscurity. Moreover, the niggardly way in which the publications of our own survey are doled out to the authors, and the plan adopted of sending none out for review, must be a mode of treatment keenly felt by the authors, who at least ought to be publicly credited with the scientific value that would be attached by all geologists to their work. In this respect the United States Government is the very opposite of our own. Their splendidly got-up volumes are sent over to the scientific journals of Europe without stint, and so the American States geologists obtain a recognition which the unaccountable stinginess of the British Government denies to ours. Prof. Lesquereux's volume is the best we have seen of the series, and it will surely take its place as a most valuable contribution to Fossil Botany.

ANCIENT VEGETATION.—The notice on this subject in last month's "GOSSIP" on American Silurian plants is not quite correct, as plants have been known long since in the "Glengariff" or "Dingle beds" of Ireland. These rocks were taken by Jukes out of the Silurians, and put provisionally in the "Old Red Sandstone," on account of the plants found in them. The "Dingle beds," however, pass downward into typical Silurians, while they are capped unconformably by the "Old Red Sandstone."—*G. H. K.*

NOTES AND QUERIES.

STARLINGS AND SPARROWS' EGGS.—Having occasion to enter the roof of our house, I came across the nest of a house-sparrow, and on looking into it found that it contained three young ones just hatched, one egg that was rotten, and to my great surprise a

starling's egg. This making me rather curious, I prolonged my search, and about three yards from the nest occupied by the sparrows I discovered a starling's nest containing five or six fully-fledged young ones. I must not forget to state that the starling's egg found in the sparrow's nest had apparently only been sat upon but a few days. Will any of your readers kindly state if such an occurrence is rare?—*C. H. Sharp.*

THE GREY "LAG."—Can any one give the meaning of the word "Lag," as applied to the goose? The proper grey wild-geese, as recognized by naturalists, is popularly called the "grey lag," and the universal summons to a flock of geese, in part of Gloucestershire, is—"Come lag, Come lag, Come lag." Now, whence "Lag"?—*G. L.*

VISITS OF THE CUCKOO.—Does the Cuckoo, like the Swallow, revisit the same place yearly? I feel interested to know, for this reason. Last year I noticed many times one of the same colour as the Kestrel, quite red; unfortunately I was not able to secure it for my collection of birds. This year again I have also seen the same bird or one very much like it, and from this circumstance I am inclined to think that the bird does return to the same place; but whether I am right or not I cannot say. At the same time, will you be good enough to describe for me the Cuckoo's egg. I have the Rev. F. O. Morris's "British Birds," but the Cuckoo's egg is not described there, I mean the colour of it. I procured a little while back a very peculiar skylark, of a fine cinnamon colour. I have it stuffed in my collection.—*Wm. Bennett.*

THE SWIFT'S APPEARANCE.—The fact of the Swift appearing on May 1st is not a very unusual occurrence. I live to the north of your correspondent, I should therefore see it a little later; yet I find, on referring to my notes, that I saw numbers on April 30. Stragglers put in an appearance about the 28th, which is about the average date for this city.—*J. B. P., Hereford.*

VARIETIES OF CAMBERWELL BEAUTY.—In reply to Mr. Morse's inquiry, I can most certainly say that he is misinformed. I have seen numbers of specimens of European *V. Antiopa*, and several British ones; there is a distinct difference in the shade of the border: in the former it is pale yellow, in the latter a pearly white or pale cream-colour. American examples vary again; the ground is the same or a little deeper, but more dappled with black specks than the European specimens; they are also much larger. I have one that measures rather more than $3\frac{3}{8}$ inches.—*J. B. P.*

HOW TO DESTROY ANTS.—In reply to Mr. George Pearce's question, as regards the most successful mode of destroying ants, he will find Keating's insect powder good, as it will at once kill them, and if scattered about the rooms and furniture infested by them, will effectually drive the ants away.—*E. Edwards.*

COLOURS OF DRIED PRIMROSES.—Can any of your readers kindly inform me how it is that the beautiful colour of the *Primula vulgaris* and *elatior* should, when destroyed, change to a bright green, leaving only the centre of the corolla (and that a small portion), together with the stamens, the original primrose-colour? The leaves turn brown. Is there any method of preserving this lovely flower, so as to retain the primrose colour of the petals?—*E. Edwards.*

DITTANY.—There is a foreign species of Marjorum called "the Dittany of Crete," much used in medicine, and known as *Origanum Dictamnus*, genus *Labiata*, and the "Bastard Dittany," *Dictamnus Fraxinella*, one of a small order of *Rutaceæ* found in Southern Europe and Asia Minor, and also the *Cunila maritima*, called Dittany, likewise belonging to the genus of *Labiata*. This is all I am able to find in my botanical books concerning Dittany, and I have much pleasure in forwarding it.—*Helen Watney*.

MANDRAKE.—Mandragera is the name applied to a genus of *Solanaceæ* or *Atropaceæ*, natives of Southern Europe and the East. Mandrakes have poisonous properties, and are somewhat like in their effects to belladonna. The roots of the Bryony are often trained round a mould, and then sold as Mandrakes. Linnæus considered the red-berried Bryony a variety of the *Bryonia alba*, or White Bryony, which is a Central European species possessing like properties to the English species.—*Helen Watney*.

ROBINS' EGGS.—I found myself some years ago a robin's nest, containing five white eggs, of a larger size than any eggs of a robin that I have ever seen, more the size of a cuckoo's egg. The other day I was asked to name an egg, which from the nest I had no hesitation in setting down as a robin's, too; this nest also had contained five eggs. As both these nests contained the full complement of eggs, all of the same size and colour, they must have been an abnormal production from the birds. If there had been a single egg, I should have concluded it to be a white cuckoo's. Is this an unusual variety? I have, you see, come across two such instances myself; others may have done the same.—*C. A. Hadcu*.

THE HOUSE-MARTIN AND HOUSE-SPARROW.—At the commencement of the past week two martins began to build under the eaves of my house. Being a great admirer of them I was pleased, and hoped nothing would hinder the completion of the nest. It was not long, however, before I noticed two sparrows taking more interest than I liked, and after five or six days, when the nest wanted but little to finish it, they drove away the rightful owners, and took possession. I could not remain neutral; so with small pebbles I tried at intervals for two hours to drive away the sparrows. This proved effective only for the moment; so I thought of another expedient. Taking my trout-rod, I tied a piece of string to the end and placed it within a foot of the nest. I never saw more of the sparrows, but in less than an hour the martins recognized the altered state of things, and soon completed the nest.—*H. G., Horbling Lodge*.

BIRDS SINGING AT MIDNIGHT.—In *SCIENCE-GOSSIP* for April 1 of this year there is an account of "Birds Singing at Midnight," by Mr. R. Standen. Goosnargh, Lancashire, in which he states that he heard the various songsters on the night of Saturday, 15th February. As I am rather anxious to fix the exact date of the occurrence, I should be greatly obliged by your informing me whether Friday, the 15th February, or Saturday, the 16th, is meant; either the day or date being evidently a misprint.—*X*.

POSITION OF THE PASQUE FLOWER.—Mr. Barrett asks in the June number of *SCIENCE-GOSSIP* whether the finding of *Anemone pulsatilla* at a certain elevation "is a universal fact, or only a partial one"? From my own experience I should say the latter. I have found it in both situations; but if I remember rightly, in greater abundance in some of the chalk ridges of the North Downs than in the lower-lying country around. I have found it growing in the

corner of a hay meadow, the land being quite flat, in the parish of Ockham, Surrey, in close proximity to some woodlands. I have also found it growing some two or three miles off, in the adjoining parish of East Horsley, on a piece of rising ground, or hilly pasture, and called the "Sheep Leas."—*J. Mills Higgins*.

SOLANUM DULCAMARA.—In reference to the notes lately given about this plant, I forward the following facts. In 1869 one of my pupils partook rather freely of the berries while he was searching one evening for "haws." On reaching home he became sick, and for several hours he was in a wild and violent delirium, requiring to be forcibly held down. This happened, too, after the stomach had been emptied of its contents, the poison having had time to extend itself into the system. The physician who attended him at his house told me that the pupils of the eyes were much dilated, and the symptoms closely resembled those resulting from taking the berries of *Atropa Belladonna*; in fact, he concluded that these were the berries the boy had eaten. Ice in large quantities was applied to the head, and the patient soon recovered. I copy this from notes which I made at the time. It could not be ascertained how many berries had been eaten.—*Henry Ulyett, Folkestone*.

QUERIES AS TO FLOWERS.—To what flowers do the following lines allude?

"One blossom, 'mid its leafy shade,
The virgin's purity portrayed;
And one, with cup all crimson dyed,
Spoke of a Saviour crucified."

Holy Flowers, M. HOWITT.

"So have I seen some tender flower,
Priz'd above all the vernal bower,
Shelter'd beneath the coolest shade,
Embosom'd in the greenest glade,
So frail a gem, it scarce may bear
The playful touch of evening air;
When hardier grown, we love it less,
And trust it from our sight, not needing our caress."

*KEBLE.
C. F. IV.*

HOP-GARDENS.—I am living in the midst of hop-gardens. Can any of your readers kindly tell me if there are any curiosities of vegetable or insect life to be gathered during the season?—*A. C. Smith, Crossbord*.

LOB-WORMS.—In reference to this subject by Professor Paley, in *SCIENCE-GOSSIP* for last month, permit me to say that the materials found at the entrance of their holes had adhered accidentally to their slime, and were rubbed off on entering. Leaves with stalks forward they do not carry, with the thin end forward they do, and frequently pass into the hole. Lob-worms clear away the things they have brought home, because it is not convenient for them to adhere again when they go out on visits of ceremony. In clean-swept lawns these encumbrances are not met with, and the entrance to the holes is not obstructed. Grass and leaves may be eaten by these worms, but I do not think they are taken to the hole, and then left at the entrance for breakfast. Fifty years ago and more I used to handle these creatures as Isaac Walton did—tenderly.—*H. P. M.*

BLACKBIRDS' NEST.—A pair of blackbirds have built a nest just six feet from the ground in a honey-suckle climbing up a verandah outside our drawing-room window, and close to a door which is in constant use for going in and out of the garden. They have now hatched their young ones in spite of all the disturbance arising from curious eyes watching them,

and from three little terriers constantly playing and barking immediately under the nest.—*M. T. Palmer.*

BATRACHOSPERMUM, &c.—I cannot say whether I shall be giving any or new interesting information when I inform your readers that recently the Misses Willis brought some fine examples of the lovely freshwater alga, *Batrachospermum moniliforme* from the stream at Ewell. And that Mr. Morse, of the original Epsom nurseries, discovered in the same parish, a habitat for *Cystopteris fragilis*.—*John E. Daniels, Epsom.*

MALFORMATION IN A SHEEP.—I saw lately in London a handsome well-grown wether sheep two years old, with five legs, the extra one being apparently ankylosed to the right scapula. The shank-bone was full-sized, but instead of one set of the other feet bones there were two, the four hoofs being prolonged into claws. I have often met with monstrosities, but not often so full-grown.—*A. Bell.*

DOUBLE LILAC.—In a garden at Southend I have observed a lilac-tree covered with double flowers. The owner told me that five or six years ago this peculiarity was first remarked on one or two branches only. The quantity gradually increased, and now the whole tree is nearly covered with double blossoms. There are other lilac-trees in the garden which have never shown any disposition to become double. Is this an uncommon circumstance? I have never met with it before.—*E. Fisher.*

SUPERSTITIOUS DISLIKE TO THE WREN.—In February's SCIENCE-GOSSIP, Mr. H. Allingham, in an interesting note, speaks of the bitter dislike which the country folk in some districts entertain to the Wren. I have occasionally met with instances of this superstition myself, but have always been unable to trace the reason for such an aversion. Mr. Allingham says the Wren has been designated the "devil's bird." Has he heard the old couplet which says—

"The robin and the wren
Are God's cock and hen?"

Apropos of this bird, I may mention that on Saturday, the 12th January, a newly-built wren's nest, containing five eggs, was discovered at Galley Hill, near Gravesend.—*G. O. Howell, Shooter's Hill.*

DOUBLE-BLOSSOMED HORSE-CHESTNUT.—In the New London-road, Chelmsford, during May, a horse-chestnut tree in the garden belonging to Weston Villa was in full bloom. The flowers were apparently all the subjects of multiplication, for in a panicle, which I took the liberty to pluck, I found twenty-four petals, and twenty stamens in one flower, and from the general appearance of the flowers on the tree they seemed more or less like it. The tree is well-grown and vigorous, equalling in height the villa near which it stands; but is by no means old, so that it may be a study for botanists during many years to come.—*John Gibbs.*

RANUNCULUS REPENS.—In Cheshire the curious or strange name of Devil's-claw is applied to this species, but in "Flora Vectensis" it is stated the term is used to an allied species, the *R. arvensis*.

THE NATTERJACK TOAD (p. 142).—This reptile emits a rather strong sulphurous scent when frightened; but only extremely fastidious persons could consider it "a most intolerable odour." The locality nearest to London in which I have found the animal is Barnes Common, where it was very abundant seven or eight years ago. It is also to be found on Coombe Warren, between Wimbledon Common and Kingston.—*W. R. Tate, Blandford, Dorset.*

CHEAP AQUARIA.—For the benefit of "W. D. B.," who asks for a way of constructing a cheap aquarium, I will describe the primitive one I have in use. It is simply a "carboy," such as can be procured at any chemical works for a small amount of money. To convert it into an aquarium lay a ring about ten inches in diameter on top of it for a guide, and run a glazier's diamond around, then use a hot wire, and you have a clean cut edge, which you can set off a little by binding with tinfoil or something of a similar nature. I don't know the exact capacity of mine, but believe it approximates something near fifteen gallons. For keeping in stock objects for the microscope, such as entomostraca, infusoria, &c., I prefer a small globe holding not more than two or three pints.—*H. F. Atwood, Chicago, U.S.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

V. G.—The insect, of which you sent us a sketch, is *Libellula depressa*.

E. E. EVANS (Brimscombe).—Hewitson, in his "Eggs of British Birds," gives no markings on the eggs of the Martin (*Hirundo urbica*). They are nearly white, with a slight plum-coloured tint at the smaller end.

T. SPENCER SMITHSON.—Your letter inquiring the name of a diatom did not contain any specimens when it reached us.

R. J. S.—The plants are not "Rushes," but "Cotton-sedges" or "Cotton-grasses" (*Eriophorum polystachyum*) common in all marshes. Its economical employment has been frequently attempted, but hitherto, we believe, without success.

W. C. PENNY (Frome).—The figure of *Nymphon gracile*, in the last number of SCIENCE-GOSSIP, is ten times the size of the animal. You will find an account of it in Taylor's "Half-Hours at the Sea-side," from which the above-mentioned illustration was taken.

WARRAWARRA (St. Vincents, W.I.).—The specimen enclosed was a species of Mistletoe (*Viscum*). Could you send a larger specimen?

C. T. M. (Plymouth).—The ferns were respectively *Adiantum trapeziforme* and *Pteris tremula*.

S. K. A. (Stafford).—Your specimens are—No. 1. Weasel-snout (*Galeobdolon luteum*, L.). No. 2. Wood Sanicle (*Sanicula europæa*).

C. S. (Sevenoaks).—Many thanks for the specimens of orchids.

R. R. (Earlston, N.B.).—The fern No. 1, is very rare (*Asplenium lanceolatum*). No. 2, the Common Male-fern (*Lastrea Filix-mas*). No. 3, *Lastrea dilatata*.

G. CLINCH.—Many thanks for your excellently-mounted specimen of fossil wood.

L. L.—Get the "Collector's Handy-book of Algæ, Diatoms, Desmids, Fungi, Lichens, and Mosses," translated and edited by the Rev. W. W. Spicer, and published by Messrs. Hardwicke & Bogue, 192, Piccadilly, at 2s. 6d.

PROF. TEMPERE.—The plant you enclosed was *Brassica monensis*. It is confined in its distribution to the western and south-eastern coasts.

E. W. ANDREWS.—Your specimen is *Ranunculus divergens*, Schulz, though a much smaller one than we have seen before.

G. S. MITCHELL.—Yes; the place of birth does not affect the children.

R. BOLTON.—The following are well known elementary books on geology:—Taylor's "Geological Stories"; "Geology," by J. Clifton Ward, F.G.S.; Jukes' "Geology," new edition, by Jukes-Brown; Skertchley's "Geology," and Tate's "Geology," published by Lockwood & Co.

N. O. (Brompton).—Your insects are—No. 1, *R. cratægata*; 2, *F. ruberata*; 3, *M. hastata*; 4, *T. balis*; and 5, *N. camelina*.

EXCHANGES.

Aceras anthropophora, *Gagea lutea*, *Silene conica*, *Scirpus pungens*, &c., for *Orchis incarnata*, *Scirpus triquetus*, *Pyrus communis*, *Potentilla rupestris*, *Carex tomentosa*, *Lychnis alpina*, &c.—G. C. Druce, Northampton.

HAVING about two dozen duplicates, well mounted, I shall be glad to exchange them. For list, &c., write to F. M. Swallow, Charing Cross Hospital, London.

WANTED, good gathering of *Pleurosigma angulatum*, for Diatoms, slides, material, or cash.—Eug. Mauler, Travers, Switzerland.

DIATOMS.—Material from Santa Monica, containing, among other good forms, *Aulacodiscus pulcher*, *Actinoplychus Grindlii*, &c. &c. Also material from islands of Fir, Trinacria, &c., very fine. Guanos and recent material required. Send list.—W. M. Paterson, Westfield-terrace, Loftus.

CAN offer sets of many rare and valuable British Eggs, side-blown, for others equally rare and valuable.—All letters answered.—T. W. Dealy, 140, Clarence-street, Sheffield.

FOSSILS from the Red Crag, to exchange for those of the Barton Series, or from the Gault.—Rev. H. B. Capel, Great Easton Rectory, Dunnow, Essex.

"CULTIVATED VEGETABLES," by Phillips, handsomely bound in calf, 2 vols., 1822, ten inches by six. Also "Ponarium Britannicum," by same author, in 1 vol., same binding, &c., in exchange for back vols. of SCIENCE-GOSSIP, *Monthly Entomologist*, or Ray Society's publications; value 20s.—G. N. Minnitt, 5, Regent-street, Nottingham.

NITELLA translucent, showing circulation, in exchange for well-mounted Slide.—J. B., 36, Windsor-terrace, Glasgow.

SEND well-mounted Slide in exchange for an Anatomical specimen (mounted).—E. Atkins, 200, Essex-road, Islington, London.

WANTED (about one dozen each) Fresh Specimens of 513 and 875 (7th edition); also Echolium. Exchange rare plants, &c.—Higginson, Newferry, Birkenhead.

A FEW well-mounted Slides to exchange. Lists to Tho. Sipton, Chesterfield.

AN Album of eighty Micro-photographs of nearly 200 of the Diatomaceæ, magnified 250 to 400 diameters, in exchange for first-class 4-inch Objective, or first-class Micro Slides (approval).—Address, Dr. Redmayne, Bolton, Lancashire.

WANTED, foreign Land and Fresh-water or Marine Shells, also British Birds' Eggs, in exchange for British Land and Fresh-water Shells, and foreign Land and Marine. Duplicates of about 100 varieties of each.—W. Sutton, Upper Claremont, Newcastle-on-Tyne.

WELL-MOUNTED Physiological specimens in exchange for unmounted material of interest.—George Baker, 37, Cross-street, N.

FOR *Ficidium tussilaginis* send stamped directed envelope, and object of interest, to Charles F. W. T. Williams, Kingmeade, Woolcott Park, Redland, Bristol.

ORCHIS SIMIA, Lam., for either 37, 106, 459, 511, 546, 949, 955, 1222, 1223, 1279, 1286, 1329, 1410, 1669, or 1678, 7th edition Lon. Cat.—A. B., 107, High-street, Croydon.

PARASITE of Crow, or other insect preparations, mounted in balsam, in exchange for Eggs of insects, Diatoms or soundings, mounted opaque.—J. Horn, 5, Belle-vue-square, Scarborough.

FOR unmounted Hair of Vampire Bat and Seal, send stamped envelope and object of interest.—E. J. Wilson, 14, Albion-road, Dalston, E.

I SHOULD be glad to exchange Lepidoptera with collectors on the Continent or elsewhere.—Roland Green, Rainham, Kent.

C. alata, *M. cixia*, *V. polychloros*, *L. adonis*, *L. corydon*, *A. ulmata*, and others, offered for Lepidoptera in any stage.—W. Jordan, Cockfield, Sudbury, Suffolk.

SEA BIRDS' EGGS (such as Guillemots, Razorbills Kittawakes, Puffins), to exchange for other Eggs, side-blown, or Butterflies.—Geo. W. Coultas, High-street, Bridlington, Yorks.

POLARISCOPE OBJECT.—On receipt of stamped and addressed envelope, will be happy to forward a small portion of "Arragonite" from coal-measures. Described in SCIENCE-GOSSIP, 1877, page 192, in reply to J. J. M.—Address, J. J. Morgan, 5, Prospect-place, Tredegar.

BEAUTIFUL opaque object (mounted), *Orbulina*, from Bermuda, for other good Foraminifera or Diatoms.—J. Ford, Wood View, Newbridge Crescent, Wolverhampton.

NOS. 171, 625, 1071, for 477, 500, 517. Lists exchanged. A very extensive list of duplicates can be supplied by C. A. O., 76, Trafalgar-road, Old Kent-road.

PLANTS of *Asarum europæum*, or *Asarabacca*, in exchange for rare British Ferns or flowering plants.—James W. Lloyd, Kington Herefordshire.

WELL-MOUNTED Slide of part of Caterpillar, showing spiracles, &c., offered for good clean material, unmounted.—J. Neville, Wellington-road Handsworth Staffordshire.

I HAVE fine specimens (collected last month) of *Fritillaria meleagris*, which I should be glad to exchange for an example of *Utricularia vulgaris*, if collected this season, or *Hieracium borealis*.—G. Garrett, Harland House, Tyler-street, Ipswich.

Hæmatofinus spinulosus from rat, and *H. vituli* from calf, offered for other animal parasites. Send list to H. E. Freeman, 1, Templeton-road, Finsbury-park, N.

SCIENTIFIC Books and Microscopic Slides, offered for Marine Animals in spirits, especially *Cephalopods* and *Echinoderms*.—Wm. Cash, 38, Elmfield-terrace, Halifax.

SIDE-BLOWN Eggs, 300 varieties, including Golden and other Eagles, Ospreys, Falcons, Owls, Greenshanks, Buzzards, Cupbills, Stints, Chough, Bartram's Sandpipers, Cranes, Storks, Aquatic Warblers, Bohemian Waxwings, Pine Grosbeaks, Great-spotted and Yellow-billed Cuckoos, Belted Kingfishers, Bustards, Buff-backed and great White Herons, Green Sandpipers, little and glaucous and other Gulls, and many other varieties. Write for list. Exchange wanted.—J. W. Sissons, 11, Priory-road, Sheffield.

PATHOLOGICAL Specimens wanted, either hardened or recent. Choice Slides of very superior finish, or select unmounted materials (of which lists will be forwarded) are offered in exchange.—Dr. Marsh, Duke-street, St. Helen's.

WANTED, one or two good specimens of *Calyptus Blumenbachii*. I will give a good exchange in Cambridge Greensand fossils.—J. W. Carr, Union-terrace, Cambridge.

SEVERAL thousand specimens of British Shells, Fossils, Minerals, Slabs of Polished Coral, Madreporæ, also specimens from Deep-Sea Dredgings, for Foreign Shells, Fossils from the Gault (if good specimens), and all other kinds of Fossils, particularly Trilobites, or Fossil Crustacea of any kind.—A. J. R. Sclater, 4, Bank-street, Teignmouth.

WANTED, *Arvicula Tarentina*, *Anomia striata*, *A. patelliformis*, *Arca tetragona*, *Pandora rostrata*, *P. obtusa*, *Thracia convexa*, *Thracia pubescens*, *Psanobia vespertina*, *P. costulata*, *P. tellinella*, *Venus casina*, *V. verrucosa*, *V. fasciata*, *Astarte elliptica*, *A. sulcata*, *A. crebricostata*, *Pecten Audouinii*, *Pecten danicus*, *P. tigrinus*, *P. similis*, *P. striatus*, *P. fortiusus*, for British Shells, if in stock.—A. J. R. Sclater, 4, Bank-street, Teignmouth.

"THE ZOOLOGIST," 2nd Series, complete, in parts, January, 1866, to December, 1876, and vol. i. of the 2nd Series, 1877, 12 volumes; also Gmelin's (S. G.) *Historia Fucorum*, 33 plates, 4to., old calf, 1768; also a Mahogany Box (16" x 8") containing specimens exemplary of the manufacture of Alum, from its raw state up to the perfect crystal (a large crystal of Alum, 14 inches long, for works on Fungi, &c. Greville's *Cryptogamic Flora*, or Sowerby's *Fungi* wanted.—C. Perceval, Hanbury, Bristol.

FOR specimen of *Anemone pulsatilla*, send address to John W. Carr, Union-terrace, Cambridge.

FOR parasites from Horse or Mole, send well-mounted Slide to George Turvill, East Worldham, Alton, Hants.

BIRDS' EGGS, side-blown, labelled; well marked and selected specimens; all ready for placing in cabinet; 300 varieties. Exchange arranged by letter. Send at once for full list, post-free, Henry Sissons, Westbourne-road, Sheffield.

A NATURALIST, who is going on a dredging cruise round the South and West coast of England, would be glad to hear from a gentleman having similar tastes who would be willing to join him and pay a small part of the expense. For further particulars address C. P. Ogilvie, F.L.S., Sizewell House, Leiston, Suffolk.

BOOKS, &c., RECEIVED.

"Contributions to the Fossil Flora of the Western Territories." Part II. The Tertiary Flora. By Prof. Lesquereux. Washington: Government Printing Office. 1878.

"The Insect Fauna of the Recent and Tertiary Periods."

By H. Goss, F.L.S., F.G.S.

"Industrial Art." June.

"Midland Naturalist." "

"Land and Water." "

"Chambers' Journal." "

"American Naturalist." "

"Botanische Zeitung." May.

"Der Zoologische Garten." No. 4.

"Comptes Rendus." No. 20.

"Feuille des Jeunes Naturalistes." June.

"Journal de Micrographie." May.

"Boston Journal of Chemistry."

"Ben. Brierley's Journal."

&c. &c. &c.

COMMUNICATIONS RECEIVED UP TO JUNE 8TH, FROM:—J. M. M.—S. G. P.—A. B.—L. L.—R. W.—A. A.—J. B.—W. H. P.—E. W. A.—J. T.—J. F. R.—G. H. K.—W. H. P.—W. B.—W. H. S.—A. C. S.—G. N.—E. de B. M.—F. M. S.—S. W.—W. E. R.—T. B. W.—Col. G. E. B.—J. M. W.—J. M. H.—G. N. M.—W. P.—H. G.—H. U.—G. P.—J. E. D.—E. M.—T. W. D.—C. S.—W. W.—M. J. P.—J. C.—H. B. C.—A. R.—A. B.—W. C.—J. W. C.—V. G.—E. E.—G. C. D.—J. H. M.—H. E. W.—H. S.—J. K. A.—W. C. P.—C. A. S.—E. L.—W. F. A.—A. M. McCa.—Prof. G.—Q. C.—Prof. B.—R. J. S.—J. P. G.—G. S.—G. M. D.—J. B. P.—J. W. L.—Dr. R. B.—J. F.—E. M. O. L.—J. J. M.—M. M. B.—J. W. N.—H. E. F.—H. P. M.—E. S.—G. W. C.—J. H.—M. V.—W. J.—W. R. T.—W. C. P.—G. C.—E. E.—R. G.—E. J. W.—J. H.—A. B.—F. W. E. S.—J. B.—C. F. W. T.—W. J. M. C.—J. W. S.—Dr. M.—J. W. B.—H. N.—B.—G.—W. D.—G. B.—W. S.—W. A. H.—C. F. W.—J. T. G.—C. W. B.—E. E.—I. C.—E. D.—S. P.—T. S.—F. M.—T. S.—H. H.—Dr. R.—J. T. G.—C. B.—P.—&c. &c.



ANOTHER WAY OF MAKING PLASTER CASTS OF FISHES, &c.

By J. H. LAMPREY, EDITOR OF "INDUSTRIAL ART."



HAVING made many hundreds of casts of sea and fresh-water fishes, and having tested every method I have seen employed, I have come to the conclusion that the simplest and most effectual plan is the following:—Place the fish on a board, pin out its fins and tail neatly

with ordinary pins, pass some brown paper or tow inside the mouth, in order to raise the eye if sunken from any cause, or to force asunder the lines of the mouth and operculum, which become contracted after death; place some putty under the dorsal fin, and then trim away all that extends beyond its outline. The fish is now ready to mould from. Next, take a long strip of thin sheet zinc, about two or three inches deep, and place it in the form of a wall all round the fish, and about one inch from it, at every point; partly split asunder a fire-wood stick, and with it clip the free ends of the zinc wall, drive in a twelvepenny nail at each end to keep this wall steady. Bear in mind that both the pin points and the nails need only sticking in the wood in the most temporary way. Now take some plaster of Paris in a cup, and, after mixing it as thin as cream, smear the inside of the zinc along its edge where it comes in contact with the board, and pour some down the place of junction near the clip. In a few minutes this extemporized dish is water-tight; now nearly fill it with the cleanest water procurable, and sprinkle rapidly from a ladle some common or second-rate plaster of Paris, coloured with a little washing-blue, over the fish until it is just covered with plaster; now lay four pieces of strong cord across the fish, leaving the ends over the sides of the zinc receptacle; having arranged these cords so that they just touch the plaster, without any loss of time continue to pour in the dry plaster until the vessel is full, or there is at

least one inch of plaster over the highest part of the fish, then remove the cords by lifting each end at once; as soon as the plaster is *set*, break away the zinc band, and strike the board sharply with a hammer until the plaster becomes detached; if it sticks closely, pour a pail of water over the plaster, and it will at once give way. Turning over the mould we have the fish buried in the case, or mould of plaster, with only a very small portion of the underside of the fish exposed where it rested on the board. Proceed to break away the thin coat of plaster which has settled along the margin until only an inch of plaster, or even less, remains from the fish outline; remove the putty from the under portion of the back fin, pull out the padding from the mouth, and then lift up the tail, draw the thin end of the fish slightly backwards and upwards; be careful not to injure the surface, but get out the jaws and raise out the back. Use no force that would break the fine surface of the mould. If need be, open the fish, and remove the intestines, and so give more space for getting out the fish; this being successfully accomplished, dip the whole mould in water, and then pour in a spoonful of naphtha, which will cover the cast with its oily adhesion; wash it again with water, and place the mould in a vessel of water; pour in the plaster so that it will fill the interior of the mould, but have ready some copper bell-wire bent to fit the tail, back fin, and pectoral fin, if raised at all. No care need be bestowed upon the *shapes* of these wire supports so long as they are flat and just roughly define the form of the tail and back fin; the plaster must be poured over the mould in sufficient quantity to represent the board on which the fish was resting. By casting under water there are no air-bubbles, and the plaster is homogeneous. After a few hours, which may be profitably spent in cleaning up the work-table of all the filthy plaster, the plaster-mould must be plunged into cold water, and the table on which it rests must be struck with a mallet. To cause the mould to separate from the cast, take a chisel, and where the line is defined by the

plaster of the mould tinted with washing-blue and the perfectly white plaster of a better description used in the casting, insert the edge of a broad chisel, and tap it gently with the mallet; make several very cautious attempts along the edge of the two plasters, until there is an evident sign of a parting having taken place; now plunge the whole under water, or pour some over the edge, and the shrinkage will give the desired cleavage. If, in endeavouring to break open the plaster, a portion of the cast is knocked away, it can be replaced, the cords drawn up through the half set plaster have served to cut it up, but if the fish is round, and the plaster has much "under-cutting," it will require much skill to break away the mould without injury to the cast beneath. It will be well, therefore, to commence operations with a flat fish, whose head, mouth, and eyes are the only highly developed portions; the fins can be pinned out, after the skin has been washed with great care, to remove all the slime with which most fish are covered. The body of the mould taken from a flat fish of course will come away like a seal, the impression beneath being devoid of undercutting, but the head of the fish cast requires great care, as about it are portions of great delicacy of structure which may break away, Casts of fishes in plaster are only of value to the student; they are heavy, and liable to injury; to be worth having, fish-casts should be *made in paper*. From the plaster moulds we have described these paper casts are made by successive layers of clean white paper, and paste made from rice flour, backed by coarse paper, chips, and thick wood shavings, interspersed in the work, or a bit of common wire netting cut to fit the mould, if the fish to be represented is large in size, as a salmon or pollack. The first layers of white paper need being spread with extreme care, and if edges do occur in these first layers, the paper must be torn and not cut, as the joining cannot otherwise be concealed. The plaster cast cannot be painted, all the attempts to make plaster and colour agree having hitherto failed, and where gilding is resorted to, the sharpness of the cast is utterly ruined. The paper cast can be painted in fine washes of water-colour, or gold and silver. The varnish over water-colour does not injure the sharpness of the mould, and it is possible so to imitate a fish, in this way, that the very keenest angler may be deceived as to the material. There are some fishes which can be cast showing both sides, as a gurnard, or a cat-fish. Suspended by a fine line, these casts are capable of accurately representing the originals, but there is one difficulty about plaster casting,—it is, without exception, the dirtiest occupation upon which an amateur can engage himself. The plaster (if not properly dealt with) will follow the operator over the house, adhering to his boots and clothes, and hands, to the great discontent of servants and others, who object to the filthy traces which are so difficult to remove from floors and carpets.

IS THE BLACKNESS ON ST. PAUL'S MERELY THE EFFECT OF SMOKE?

BY PROFESSOR PALEY, M.A.

MANY years ago I took a great deal of pains to investigate a question which to many, perhaps, will appear both trifling and useless, but which really has an important bearing on the aspect of our great public buildings. It is often said, that Paris is not such a smoky city as London, because the stone buildings are much whiter. The north side of St. Paul's Cathedral must, from its extreme blackness (curiously relieved as it is by lines and patches of light), have attracted the attention and excited the regret of most observers. There are other buildings, of course, *built with the same kind of stone*, which are equally black; there are even towns, such as Bath, built entirely of a similar (oolite) stone, where all the new houses are of a rich creamy colour, but most of those built a hundred years ago are as black as a piece of black cloth.

From investigations I made, and which I think worth being recorded, in order that further inquiries may be conducted with patient and scientific care, I was led to believe that this blackness is due to a hitherto unknown and undescribed species of lichen.

Two of its peculiarities are, that it only grows upon some kinds of limestone, and it will not grow where the rays of the sun fall directly upon the surface.

I first noticed the latter fact in a wall of rusticated Italian work at Cambridge. It faced due west, and it overlooked the country for many miles, so that smoke was not likely to have caused the blackness. The whole wall in this part reminded me somewhat of the lights and shades of a photograph. Those surfaces were quite black on which the sun could not fall, and those remained quite white on which the rays were directly incident. I concluded that, at least, sun-light was in some way concerned in the appearance produced. But what reason can possibly be alleged why a stone should contract less soot in the light than in the dark?

I proceeded to scrape off some of the black surface, which I collected, in the form of black dust, exactly like gunpowder. If, I argued, the blackness is really soot, surely a washing in hot water with soap or soda will bring me white lime-dust, or lime-sediment. But no! I might as well have tried to "wash a blackamoor white." The gunpowder was gunpowder still, as far as the look of it went.

Then I tried the microscope. The washed granules were intensely black, somewhat amorphous in appearance, and more or less angular. My power was not very high, and my knowledge of such very minute cellular structure was too small: I could not say whether the object was organic or inorganic. I was afterwards told that under a good microscope it

had been conclusively proved to be vegetable, *i.e.* a lichen.

I found by extended inquiry that the Portland, the Bath, and the Barnack (also lower oolite) stone were all liable to the blackening in the course of time. But the churches and buildings of sandstone, in that most smoky of towns, Wolverhampton, were not blackened at all. Evidently it was an effect peculiar to limestone.

I observed further, that in fluted columns, window-jambs, arches, &c., the blackness was always in proportion to the absence of sun-rays, and that the stone remained quite white where the sun shone full upon it. If any one will walk round St. Paul's, and compare the south with the north side, he will see the difference. Let him also notice the lines left white by the oblique rays of the summer sun on parts of the north wall.

In Bath, you may see whole ranges of buildings, like the Circus, so black on the sunless side, that in many cases the walls have been painted with black paint, as giving at least a more shiny and respectable black than my mischievous little lichen, which has a dingy, sooty, uncanny appearance.

In other parts you may see a wall on the north side perfectly black, while the east wall of the same building is perfectly white.

On the smoke-theory, this is inexplicable; on the light-theory, it is precisely what we might expect.

For if this blackness is really, as I now fully believe, due to the gradual growth of a lichen, we may conclude that it dislikes surfaces warmed and dried by the sun; and it is also to be inferred that the lime is a necessary part of its food. I examined a curious lichen, that grew in circular patches on the Barnack stone in Peterborough Cathedral, and I found that it had the property of extracting quantities of lime from the texture of the stone.

But its extremely slow growth, requiring a long series of years before complete blackness results, its very hard and stony texture, its amorphous form, and its extremely low organization,—the lowest, perhaps, that vegetable life can possibly possess,—render its history a very interesting one.

The practical result of the inquiry would be, to ascertain if Portland and Bath stone can be treated with some chemical solution, such as sulphate of copper, which would prevent the growth of the lichen, supposing it really to be such. It would be a valuable scientific discovery that a brush and a pail would restore surfaces that no water-washing will keep clean, and not only restore, but prevent from future discoloration.

If it be true that the beautiful Caen stone used in Paris does not become thus black, it must be due to causes well deserving of investigation. One cannot help hoping that some process of "pickling" building-stone may be discovered, which will tend to

make churches and mansions less like an undertaker's hearse.

I have not given, in this brief paper, the substance of nearly all the observations, experiments, and reasonings, which led me to the result I have described. But I think some grounds of probability have been shown, enough to encourage those who are competent to prosecute the inquiry.

It is still open to conjecture, that some chemical change in the texture of the stone,—some oxidizing process gradually effected by the air,—may be the cause of the blackness. But the singular effect of sun-light in preventing it is a fact beyond all question, and one that must be borne in mind in forming any conclusion on the subject.

A CHAPTER ON MICROSCOPIC FUNGI.

(*Perisporiacei.*)

By GREENWOOD PIM, M.A., F.L.S.

THIS is a small but very interesting group of leaf parasitic fungi, and includes most of the forms popularly known as Mildews. In their immature condition three species of this order form the mildew of the rose, vine, and hop, respectively. That the vine mildew is a member of this group is to a certain extent an assumption, as its perfect fruit has never yet been discovered; and it is only by its analogy to, almost its identity with, the rose, pea, and hop mildews that it is believed to be the conidiophorous condition of an allied species.

All Perisporiacei consist at first of a woolly growth, consisting of delicate threads of concatenate cells, arising from a mycelium, which makes its way through the parenchyma of the stems and leaves of the plant on which it occurs. Under a low power of the microscope a mildewed rose-leaf looks like a delicate forest of crystalline vegetation. The threads break up very easily into their component cells, each of which, on meeting with a suitable nidus, immediately commences a separate existence, and, as is well known to rose-growers and others, spreads with a rapidity almost marvellous. In this condition the various species obtained the name of *Oidium*, and it is only comparatively recently that the identity of the *Oidium* with the fully-developed conceptacles of the mature form has been demonstrated.

In the case of the vine mildew, only the *oidium* or conidiophorous condition is known; the cells of these threads being known as *conidia*. In the other species, towards autumn a kind of spherical capsules are formed, each containing one or more sacs or *asci*, which include 2, 4, 8 or more spores. These conceptacles are usually furnished with curiously-formed appendages, threadlike, curved, hooked, horned, needle-shaped, forked, &c. By these characters, as well as the number of *asci* and spores, the species which were

formerly almost all included in the genus *Erysiphe*, have been divided into the following genera:—*Perisporium*, *Lasiobotrys*, *Sphaerotheca*, *Phyllactinia*, *Uncinula*, *Podospheera*, *Microsphaeria*, *Erysiphe*, *Chatomium*, *Ascotricha*, *Eurotium*.

I will endeavour to describe the forms most usually met with, and would refer any one who wishes for fuller and more detailed information to Dr. Cooke's "Rust, Smut, Mildew, and Mould," and to his "Handbook of British Fungi," to the latter of which I am indebted for the generic and specific descriptions.

PERISPORIUM, *Kunze*. Perithecia (conceptacles) subglobose, without manifest mycelium or appendages; spores numerous. The three species described are far from common, and appear to approach in character the neighbouring order *Sphaeriacei*.

LASIOBOTRYS, *Kunze*. Erumpent, central perithecia between fleshy and horny, proliferous, collaps-

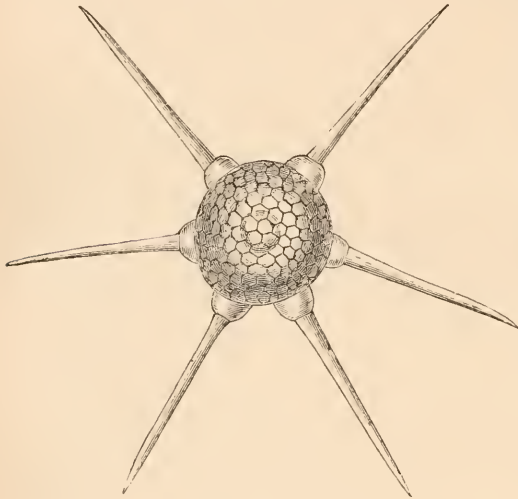


Fig. 110. *Phyllactinia guttata*.

ing above, attached to radiating fibres; secondary perithecia ascigerous; asci cylindrical. There is only one species, which is parasitic on living leaves of *Lonicera*—*L. lonicerae*, Kze., which, though not common, appears widely distributed. It differs from the rest of the order in being subepidermal.

SPHÆROTHECA, *Lev*. Perithecia globose, springing from an arachnoid mycelium, containing one many-spored ascus. *Sphaerotheca* is distinguished from *Erysiphe* by having a single many-spored ascus, while the latter has several asci, each containing but few spores. Appendages numerous, floccose.

S. pannosa, *Lev.*, the Rose Mildew, occurs on leaves, petioles, &c. of roses. The conidiophoreus condition is extremely common, while the perithecia, which are very minute, occur but very rarely.

S. castagnei, *Lev.*, which differs but little from *S. pannosa*, is found on Hops, Meadow-sweet, &c.

PHYLLACTINIA, *Lev*. Perithecia hemispherical, depressed; appendages needle-shaped, stiff, and brittle.

P. guttata, *Lev*. Conceptacles large, easily distinguished by their straight acicular appendages. Occasionally very abundant on Hazel, also on Ash, Elm, Alder, Birch, Oak, Hornbeam, &c. (fig 110).

UNCINULA, *Lev*. Perithecia globose; appendages numerous, simple, or dichotomous, always hooked.

U. adunca, *Lev*. Perithecia scattered, small; appendages simple, hooked; asci 8–12, containing 4 spores. On leaves of Willows, Poplars, Birch, &c. Rather common (fig. 111).

U. bicornis, *Lev*. Mycelium effuse; perithecia rather large; appendages bifid, hooked; asci 8,

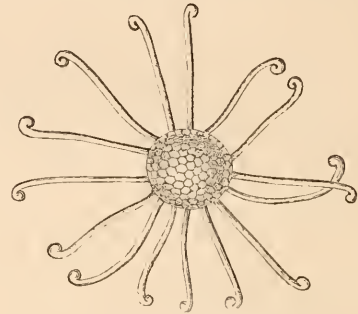


Fig. 111. *Uncinula adunca*.

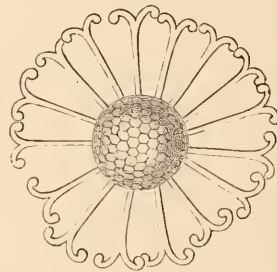


Fig. 112. *Uncinula bicornis*.

containing 8 spores. Sycamore-leaves,—common, (fig. 112).

U. Wallrothii, *Lev*. Perithecia minute; asci 12–16, 6 spores; appendages very long, hooked, simple. Distinguished from *U. adunca* by the greater length of the appendages (fulcra).

PODOSPHERA, *Kunze*. Mycelium arachnoid; perithecia globose, containing a single 8-spored ascus; appendages few, repeatedly dichotomous, thickened at the extremity, hyaline.

P. Kunzei, *Lev*. Perithecia minute, scattered, globose; appendages 3 times the diameter of the perithecium. On plum-leaves.

P. clandestina, *Lev*. Similar to *P. Kunzei*, but appendages much shorter and more numerous. On

leaves of hawthorn, common ; the conidia stage very abundant in spring.

MICROSPHÆRIA, *Lev.* Perithecia globose, with many asci ; appendages dichotomous.

M. Hedwigii, *Lev.* Hypophyllous ; conceptacles minute ; appendages few, scarcely longer than the perithecia ; asci 4, containing 4 spores. On mealy Guelder Rose (fig. 113).

M. penicillata, *Lev.* Appendages 8-12, equal to diameter of perithecium ; asci 4, containing 8 spores. On Guelder Rose and Alder.

M. mougeotii, *Lev.* Appendages loosely dichotomous ; asci 12-16, 2-spored. On leaves of *Lycium barbarum*.

M. berberidis, *Lev.* Mycelium web-like, persistent ; appendages 5-10, long, divaricate, obtuse ; asci 6 ; spores 6-8. On Berberry,—abundant.

M. grossularic, *Lev.* Mycelium web-like ; perithecia scattered ; appendages 10-15, vaguely dichotomous ; asci 4-8, spores 4-5. On gooseberry-leaves,—very common.

M. comata, *Lev.* Perithecia scattered, minute ; asci 8, ovate beaked, containing 4 spores. On *Euonymus*.

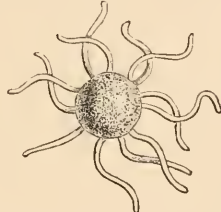
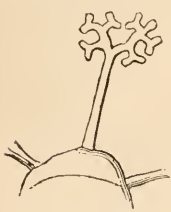


Fig. 113. *Microsphaeria*. Fig. 114. *Erysiphe Montagnei*.

ERYSIPHE, *Hedw.* Mycelium arachnoid ; appendages floccose, simple or irregularly branched.

* Asci 2-spored.

E. Linkii, *Lev.* Perithecia minute, scattered ; asci 8-20, pyriform ; appendages interwoven with the mycelium.

E. lamprocarpa, *Lev.* Perithecia minute, globose, scattered or gregarious ; appendages coloured ; asci 8-16, shortly pedicellate. On Salsafy, Plantain, &c.

** Asci 3-8 spored.

E. graminis, *D.C.* Mycelium effuse, floccose ; perithecia large, hemispherical, at length depressed and semi-immersed ; appendages simple ; asci 20-24. On various grasses—autumn.

E. Martii, *Lk.* Mycelium web-like, often evanescent ; perithecia globose, varying from yellow to black ; appendages short ; asci 4-8, globose, with 4-8 spores. On Peas and Umbelliferae,—very common.

E. Montagnei, *Lev.* Perithecia minute, globose ; appendages distinct from mycelium ; asci 8, spores 2-3 (fig. 114).

E. tortilis, *Lk.* Perithecia minute, globose ; appendages very long, 10 times diameter of perithecium ; asci 4, with 4 spores (fig. 115).

E. communis, *Schl.* Mycelium effuse, evanescent or persistent ; perithecia small ; appendages short ; asci 4-8, ovate-rostrate, 4-8 spores. On various Leguminosae, Ranunculus, &c.

E. horridula, *Lev.* Mycelium web-like ; perithecia clustered ; asci 20-24, oblong, attenuated, with 3-4 spores. On Bugloss.

CHÆTOMIUM, *Kunze.* Perithecia thin, brittle, mouthless ; asci linear ; spores lemon-shaped.

C. elatum, *Kze.* Perithecium sub-ovate, hairs on vertex very long, interwoven, branched ; base of perithecium fibrose ; sporidia broadly apiculate. On straw.

C. chartarum, *Ehb.* Perithecium subglobose, black, surrounded by a bright yellow spot ; spores subglobose (fig. 116). On paper.

C. glabrum, *B.* Recorded by Berkeley, not described ; cf. "Grevillea," ii. p. 165.

C. murorum, *Corda.* Gregarious, glaucous blackish ; perithecium sub-globose, brown, hairs circinate,

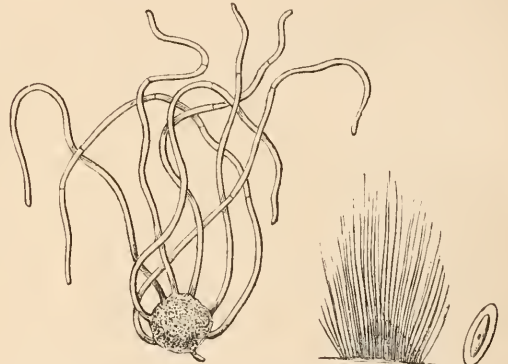


Fig. 115. *Erysiphe tortilis*. Fig. 116. *Chaetomium chartarum*.

pulverulent, erect, septate ; spores oblong. On plaster.

C. griseum, *Cooke.* Subgregarious or scattered, grey or cinereous ; perithecium globose, brown, sub-membranaceous ; hairs long, elastic, circinate, pellucid ; asci clavate, fasciculate ; spores lemon-shaped, colourless, endochrome granular. On old sacking. (Cooke in "Grevillea," i. p. 175.)

C. funiculum, *Cooke.* Perithecia scattered, sub-ovate, black ; hair on vertex very long, dichotomous or simple, erect, slender, acute, black ; sporidia lemon-shaped, dingy brown. On twine. British Museum. (Cooke in "Grevillea," i. p. 176.)

ASCOTRICHA, *Berk.* Perithecium thin, free, mouthless ; threads loose, branched, conidiophorous ; asci linear ; spores, dark elliptic.

A. chartarum, *B.* Perithecia olive-brown. On paper.

EUROTIIUM, *Link.*—Perithecia reticulated, vesicular, coloured, attached to mucedinous threads.

E. herbariorum, *Link.*—Perithecium spherical,

flattened, yellow, seated on radiating, branched, intricate flocci.

On various decaying substances, tan, &c. This is the fully-developed form of *Aspergillus glaucus*.

A word in conclusion as to mounting these fungi for the cabinet. They seem to be best put up in shallow varnish cells, filled with glycerine and water. Deane's gelatine, so invaluable a medium for most other vegetable preparations, is too viscid, the appendages enclosing a myriad of air-bubbles, which in gelatine are almost impossible to get rid of. Moreover, without a cell the covering-glass presses too closely and is apt to cause the perithecium to rupture from pressure. The *modus operandi* is a simple one. When the cell is ready, filled with dilute glycerine, scrape the leaf on which the parasite grows with a sharp knife, which will remove a good number of perithecia; push gently into the mounting fluid, and finish as in any other wet mounting.

ON TANKS FOR THE BREEDING AND MAINTENANCE OF MICROSCOPIC ORGANISMS.

IN the May number of SCIENCE-GOSSIP a correspondent seeks information on the subject of the establishing and management of tanks or receptacles for the preservation and development of microscopic organisms. To the microscopist it is a matter of some importance, and one of which there seems to be no record of any valuable, reliable, or actual experience. The subject is of deep interest, and possibly your correspondent and readers generally may consider the few following notes, founded on many years' experience, worth attention, more especially as the mode of establishing a permanent tank, containing microscopic plants and animals only, is not generally studied or even understood, the popular idea being that a collection of organisms found in the water of a rich pond turned into a glass vase will *at once* afford and possibly maintain and develop objects of interest and curiosity for immediate examination, when in fact a keeping or breeding tank requires many months, sometimes years, for the perfect development of its contents. No one could hope to raise the most interesting features (to a microscopist) of a garden in a few days. Time and the seasons are required to develop the mosses, lichens, fungi, and obscure growths to be found on good rockwork: the same prolonged causes developing life, apply (perhaps in a lesser degree) to the microscopist's breeding-tank; it is a question of patience. As a notable instance, the statoblasts of the most beautiful of fresh-water polyzoa (*Lophopus*) are frequently found in early autumn in the muddy sediments of ponds, rich in microscopic life. This sediment, transferred to a well-ordered perfectly-balanced tank, will produce the young polyps freely in

the spring, and there are numerous instances of a similar character where time is a factor in the appearance of microscopic life in captivity.

In the practical management of these tanks two points are of essential importance: first, size, and, as regards light, position; secondly, the internal arrangements, and the character, requirements, selection, and management of the occupants, both vegetable and animal, so as to ensure development and reproduction.

The shape and place of occupation of the receptacle claim the first attention, and are of great importance. It is true that ordinary glass jars or vases of various sizes are continually used with more or less success in preserving living objects, but they utterly fail as breeding or developing places: their circular forms impede observation; again, their portability causes them to be frequently shifted into different aspects, which is fatal to steady development. They are too often placed in positions overwhelmed with light, when they rapidly become choked with filamentous algæ, destructive to the preservation of the higher microscopic forms. The proper adjustment of light seems to be the touchstone of success in the cultivation of organisms, both animal and vegetable. The vitality of some water-plants, under what would seem the most unfavourable, but, as it turns out, the most favourable circumstances, is very singular; the merest fragment of *Nitella* will live for months in a wine-glass of water, or even in a small test-tube, if kept in a cool and rather dark place, but abnormally excited by exposure to sun, light, and heat, it soon fades and collapses. This is a lesson of importance, as undoubtedly the same influences affect minute animals.

The tanks for the purpose in question should not be too large; a convenient proportion, and meeting all contingencies, is a vessel made of narrow iron frame-work, glass sides and ends, with slate bottom, measuring fourteen inches wide, fourteen deep, and twenty-eight inches in length. Two or more of these tanks are necessary: two are indispensable, as there is a marked difference in the character of the occupants of a tank facing a wall with only side light (and no sun) and another facing a window (north aspect) with occasional rays of setting sun. Besides these permanent and larger receptacles, *square* glass vases or vessels, such as are sometimes used for galvanic battery cells, of the capacity of three pints, are very valuable to contain objects dipped from the larger tanks for special observation on the study table.

The permanent tanks should be placed in position and never again moved. A good aspect is north-east, fronting a window catching an hour's early morning sunlight, but a better is against the wall of a room or hall with a full side-light, and no sun; the difference between the life contained in tanks placed in such positions is strikingly apparent. Of the internal arrangements anything approaching the idea to make it "pretty" should be studiously

avoided: nothing should be included but with the object of use—the more useful the more beautiful it will be; two pieces of goodly-sized stone or irregularly shaped brick should be placed nearly touching the front glass; these stones soon become covered with organisms, and may be so adjusted as to be within range of an ordinary magnifying lens. Two or three plants (not more) of *vallisneria*, or *chara*, are to be planted in *one corner* in well-washed gravel, banked up with one of the pieces of stone; the other part of the floor of the tank should be left bare, to facilitate the picking up, free of sand or gravel, of anything that may appear. If a pond be accessible, three parts of the tank are filled with water from it; if it be cloudy or even muddy the result may be more favourable. After being left in repose for at least a week, the character of the contents (if the pond be fairly productive) will be seen; the water will be clear and probably reveal a variety of common objects, such as larvæ of insects, entomostraca, planaria, and hydræ; in a week or more vegetable growth will appear, covering every portion of the interior. The tank is now in a condition to be inoculated with whatever choice objects can be obtained, the result of special and favourable gatherings, and this should be repeated frequently; the front glass must be occasionally cleaned with a sponge tied to the end of a cane, but on no account be tempted to touch the sides or back: the water will soon become as clear as crystal, however muddy it may have been when first introduced. The pieces of stone will show signs of vegetable growths, with patches of such forms of infusoria as *vorticellæ* and stentors. The waste from evaporation must be supplied by additions of pond water (the richer the better), and such a tank will be, in a month or two (not before), a marvel of microscopic beauty and interest. The untouched back glass will be covered with a dense mantle of dark-green velvety vegetation, in the midst of which will be discovered groups and patches of the fixed infusoria, and it is essentially the habitat of the polyzoa; hydræ, and the rarer rotifera *philodina*, even *melicerta* and *stephanoceros*, may be found under such circumstances, to say nothing of the countless tribes of free infusoria, ever ready for observation in all their various phases of existence, and such conditions will preserve and increase them indefinitely. Enemies to eliminate are larvæ of insects (but these soon disappear naturally), the fluviatile arachiadæ, and the larger molluscs; the latter in browsing through the vegetation on the glass are apt to destroy perhaps a favourite group of stentors. Other enemies are the floating filamentous algæ; they should be removed, but if the tank be well watched as regards light no trouble in this respect may ensue. Nothing ought to be *planted* in the middle, as it is of importance the back glass should be clearly seen, and much may be lost if anything impedes this view. It needs hardly be said that the water must never be changed.

Tanks so established will greatly improve by time, even when it extends to years. It is worthy of note, as a matter of practical observation, that a great excess of animal life (of a certain character) much conduces to the development and well-being of microscopic life. In a tank measuring fourteen inches deep by fourteen wide and twenty-eight inches long, five full-grown Mexican axolotls (nearly as large as water-rats) have existed and thriven for more than four years. In every part of this tank there are swarms of crustacea, infusoria, and rotifera, and the back glass facing a wall is covered with the velvet-like growth, shading off into patches of pale browns and purples, imbedded in which are considerable masses of living animal objects. It would seem as if the rejectamenta of these axolotls (they are fed once a week with strips of raw beef) is conducive to the development of life. In large ordinary tanks with growing plants of *vallisneria*, and not devoted to the special object of these notes, it is desirable to have a piece of floating wood; it will in a few weeks or months form the nidus or habitat of many strange organisms. Vegetable forms requiring running or moving water, as desmids, volvox, &c., cannot be reared or even kept in captivity. Much might be said of collecting to supply tanks with objects did space admit, but hydræ and countless forms may be procured in abundance by the very simple process of bringing in a handkerchief-full of duckweed, washing it thoroughly in a pan, rejecting the weed, and pouring the resulting water into the tanks.

Crouch End.

E. D.

HOW TO USE THE MICROMETER.

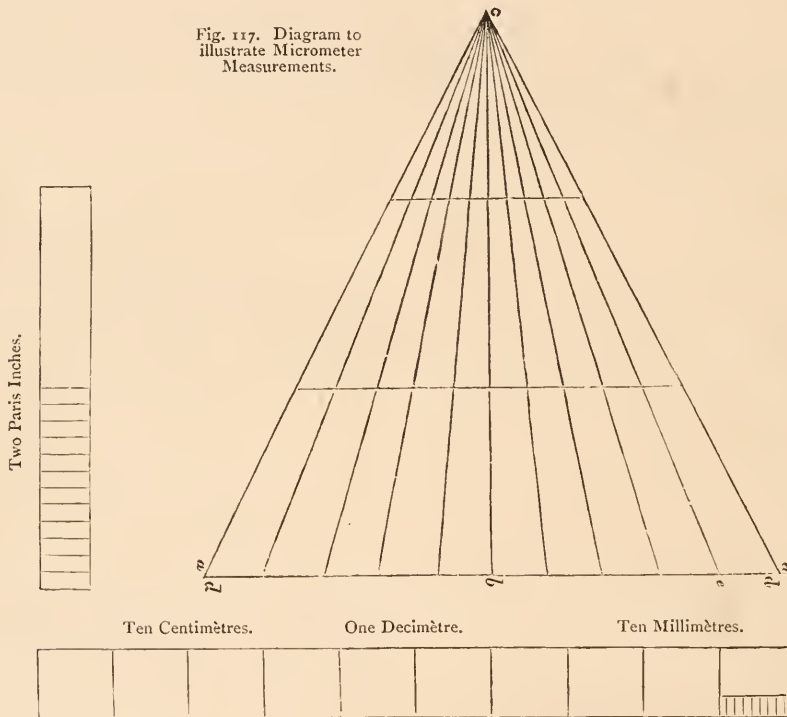
By F. KITTON, Hon. F.R.M.S.

ALL interested in microscopic studies have been more or less inconvenienced by the frequent absence of a scale of measurement attached to the figures; this is a great blemish in that otherwise valuable work, "The Microscope," by Dr. Carpenter. This in many cases was no doubt unavoidable, no scale having been given with the original figures. As the measurement of microscopic objects is by no means difficult, every one using the microscope should make it a rule to ascertain the dimensions of the objects he is examining. The only additional apparatus required is some form of camera lucida: personally I prefer Wollaston's; others give the preference to Beale's neutral-tint camera lucida (the former costs 21s., the latter 7s. 6d.), and a micrometer ruled in $\frac{1}{100}$ and $\frac{1}{1000}$. The chief difficulty in using the camera of Wollaston is bisecting the pupil of the eye with the edge of the prism; if this is not carefully attended to either the paper or the object becomes invisible: practice soon overcomes the difficulty. In using either form of camera it is necessary that the body of the microscope should be horizontal.

In using the camera lucida two things have to be considered : the distance of the prism or the reflector from the object, and its distance from the paper. (In my own instrument the edge of the prism with B ocular, and $\frac{1}{4}$ -in. Ross objective, is exactly 12 inches from the object ; this distance with the paper 10 inches from the edge of the prism gives a magnification of 369 diameters.) As the length of the body and the magnifying power of the objectives and ocular are variable, it is best to construct a scale for the purpose of ascertaining in the first instance the amplification employed ; the most convenient is the following : Rule a line 10 inches in length, *a*, (fig. 117), and from the centre of this rule another

from 300 to 500 diameters by using the A B and C oculars, and adjusting the amplification by means of the draw tube or the elevation of the microscope. A memorandum may be kept of the ocular used, the length of tube, &c., but I always measure off a $\cdot 01$ with micrometer, which should of course represent 1, 2, 3, 4, or 5 inches, according to the amplification employed.

The eye-piece micrometer, in its simplest form, consists of a disc of glass upon which a series of equidistant lines are engraved ; this is placed on the diaphragm in the ocular, the lines being magnified by the eye-lens. The distance of these lines is not important, but, whatever their distance, they must be



line, *b*, of the same length at right angles to it ; carefully divide these lines into inches and tenths, then rule lines commencing at *a* to the point *c* parallel to the vertical line *a* ; rule nine other lines 1 inch apart : each of these divisions represents one hundred diameters. The inner margins of the lines *b c* should be divided into tenths, and we shall then have a series of diameters increasing by tenths 100, 110, 120, &c. This space between the lines *a* and *c* should be ruled as accurately as possible with lines $\frac{1}{10}$ of an inch apart ; this will give measurement to the $\cdot 0001$ of an inch. I always prefer using such diameters as are easily divided, viz., 100, 200, 300, 400, &c. With my $\frac{1}{4}$ objective I obtain a range of

made to coincide with the divisions on the stage micrometer ; when this has been done the object is placed on the stage, the number of divisions occupied by it gives the diameter in parts of an inch or millimètre, according to the divisions of the stage micrometer. This method, although somewhat less troublesome than that just described, is not so accurate, and if the object is somewhat opaque (e.g., *Aulacodiscus formosus*), the divisions on the eye-piece micrometer are very indistinct.

For very delicate measurements eye-piece micrometers with fine screw adjustments are used, but for ordinary measurements the camera lucida and stage micrometer will be found sufficiently accurate.

Microscopic dimensions in England and America are usually given in parts of an inch; Continental observers now generally employ some division of the millimètre, such as '1, '01, '001; the latter is sometimes written thus: 1μ ($\mu = 1$ millième) '001 of an English inch = 25μ '399. An English inch contains 25 mm. '3995. A millimètre may be roughly estimated as being equal to $\frac{1}{25}$ of an inch.

Ehrenberg, Kützing, and the earlier microscopic observers used fractions of the Paris line, or the $\frac{1}{12}$ of a Paris inch; the latter equals 27 mm. '12; the Paris line equals 2 mm. '255. Rees gives the Paris line '088815 of an English inch; the nearest vulgar fraction to this is $\frac{2}{23}$ = 0.087121, differing by less than 1-500th of an inch. Practically the French inch is equal to $1\frac{1}{16}$ English inch.

The scale used by Ehrenberg was 1-25th of a Paris line, magnified 300 diameters equalling two Paris inches in length.

NOTES ON THE RHODODENDRON.

ON Saturday, the 1st of June, on our visit to the Rhododendrons, at Cobham Park, my attention was drawn to the form of the flower by a query from one of the party as to how fertilization was brought about, seeing that the stamens and style all pointed upwards, and the style was greatly exerted beyond stamens. I was thus led to pay particular attention to the point; and, I think, was enabled to arrive at a just solution.

A very small amount of attention demonstrated quite clearly that the plant is proterandrous, *i.e.*, that the stamens arrive at maturity before the stigma is in a receptive condition; and that, therefore, although the flowers are bisexual, they are to all intents and purposes unisexual, as the stamens of a given flower cannot fertilize the ovary of the same flower. This might be inferred from the size and showiness of the flower, as such plants, it has been clearly shown, are usually entomophilous, *i.e.*, are fertilized through the agency of insects. We were soon enlightened as to the peculiar fitness of the upturned style and stamens for the purpose of securing cross fertilization by the agency of large honey-loving insects, such as the bee. While examining a cluster of flowers a large bee or bee-like insect was seen to enter a flower; and, alighting upon the stamens, to apply its long proboscis to the upper part of corolla at a point about half-way down the tube. An examination of other flowers showed in every case at this part a large drop of fluid matter resembling dew or rain, but which proved, on tasting, to be honey.

The *modus operandi* of fertilization was now patent enough. Large insects, such as the bee, are attracted by the honey; and, from its position within the tube

of the corolla on the upper side, and from the form and position of the up-curved stamens, are unable to reach it without, in the male condition of the flower, literally dusting the under-side of the thorax and abdomen with pollen, and without, in the female condition, where the style protrudes beyond the now pollenless stamens, depositing a portion of their treasure upon the expanded glutinous stigma. Thus, as they flit from flower to flower, in search of honey for their own benefit alone, do these insects unwittingly carry on a work that is absolutely essential to the continuance of the specific life of the Rhododendron.

We may thus in a general way see and admire the mutual adaptation of insect and flower for each other's good, but a closer examination of the flower will reveal to us many small modifications in the form of corolla, stamens, ovary, &c., which cannot fail to increase our admiration.

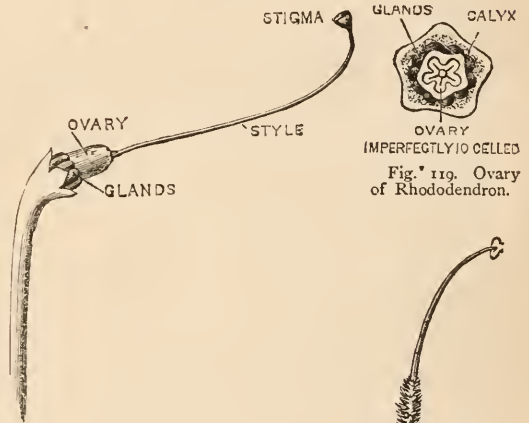


Fig. 118. Pistil of Rhododendron.

Fig. 119. Ovary of Rhododendron.

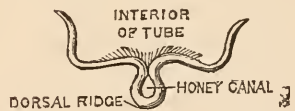


Fig. 122. Cross section of tube of Corolla.



Fig. 120. Stamen of Rhododendron.

First, with regard to the colour of the corolla. This is of an almost uniform tint, varying in different plants, from deep rose-colour to pale pink, or even white. Within the tube, however, on the upper side a number of yellow oblong splashes will be found forming more or less distinct lines, clearly converging upon the drop of honey already alluded to. Sir J. Lubbock has shown by direct experiment that insects profit by experience, and having once learnt that certain lines or striæ lead to their food, use them as guides in their future excursions. Hence, doubtless,

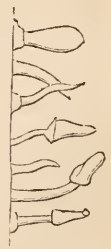


Fig. 121. Glandular hairs at base of Stamen (mag.).

the *raison d'être* of these lines or splashes in the Rhododendron.

Secondly, with regard to the form of the corolla. This, as in all Ericacæ, is monopetalous. When pulled off and examined, it is found to be curiously folded and plaited, especially near the base of the tube on the upper side. A cross section taken near the base is fairly represented by fig. 122 (magnified). It will be seen from the figure that the dorsal fold is so deep and perfect as to form a tube or canal. This channel gradually shallows out at the point where the honey is always found. What is its use? At first sight it appears as though the honey were secreted by the corolla itself at the point where found, but such is not the case. On pulling off the corolla, the honey will be seen oozing from the upper side of the base of the ovary. The use, then, of this fold appears to be to act as a tube for the passage of honey from the base of the corolla to a point nearer its mouth where it is more readily accessible to insects of a large size. The honey, doubtless, passes up this tube by means of capillary attraction.

The stamens are very peculiar, as will be seen from fig. 120. The lower half is thickly covered with stiff glandular hairs of very various forms and lengths. Some of these forms are represented in fig. 121. One use of these hairs is, perhaps, by firmly interlocking, to strengthen the stamens, and enable them the better to resist the pressure of insects alighting upon them; but the principal one, I should think, is by means of their crowding and intertwining, to prevent smaller insects, that would be incapable of carrying on the work of fertilization, from penetrating to and carrying off the honey, which is the incentive to the visit of those larger insects that are capable of performing the task. The bottom of the stamens, as shown in fig. 120, is free from hairs, and rests in a groove in the hypogynous disc that surrounds the base of the ovary. This insertion in a groove and close application to the ovary cannot fail to give additional stability and strength to the stamens as a whole, while it most effectually prevents any insect from arriving at the source of the honey.

The imperfectly ten-celled ovary, with its surrounding secreting disc, is represented by fig. 119. The upper two lobes only of this disc, which are larger than the rest, appear to be concerned in secreting, or, at all events, in pouring out the honey.

This paper is written, not as an exhaustive account of the flower of the Rhododendron, but as an incentive to further examination by others. As my opportunities of observation are small, I feel sure that those more favourably situated may, by a little attention, show us many curious and highly-interesting points that I have altogether overlooked; and I, for one, should be very glad to get a fuller and more perfect account of this plant.

Rochester.

J. HEFORTH.

ACCLIMATIZATION OF PALMS.

By STAFF-SURGEON R. NELSON, R.N.

PLANTS differ greatly from animals in the closeness of their adaptation to meteorological and other conditions; hence, on the one hand, while in England, we can have parrots, monkeys, lions, tigers, and other tropical and sub-tropical animals, live with us during winter, and even the polar bear look as pleased as a bear can look during our hot summer months; we lose, on the other hand, the enjoyment of many beautiful wild flowers and magnificent forest trees which enliven the scenery and greatly enhance the pleasure of the traveller abroad.

Who that has travelled much does not remember the pleasure, nay, the rapture which he felt as he neared his first foreign port—say Madeira, for instance—in beholding the luxuriant “feathery palm-trees rise,” as Heber sung when he linked them together with other of our earthly conceptions of “the better land.” They are undoubtedly the first objects which forcibly strike the wanderer, and enable him to realize that his dear old home is far behind, and that he is, indeed, in a distant land. There is nothing so thoroughly foreign to the eye, and few objects in nature more attractive. The long-tailed Celestial, the almond-eyed “Jap,” and the black-skinned negro, have been long familiar in our streets, but the palm stands out in broad relief as the first novelty which attracts attention abroad.

Having lately spent some months in Shanghai, I have been led to these remarks by observing, during the present severe winter, how well the few palm-trees planted there have withstood the rigour of the climate, and was first forcibly struck with the subject when, one bitterly cold morning, a friend called my attention to the almost anomalous condition of nature, that the palm-trees were covered with snow; and very pretty objects they were.

What *genus* or *species* of Palmacæ they belong to I cannot at present discover, but doubtless many readers of SCIENCE-GOSSIP know which are the hardiest of the order. That the specimens planted along the Bund of Shanghai are as graceful as the lofty cocoa-nut trees of Ceylon, or the Sago-palm of Borneo I do not maintain; but they are well worthy of the attention of those interested in the acclimatization of plants, for few things would add more to the beauty of our parks, or better set off a landscape than endogenous trees, of which our climate has, or is supposed to have, deprived us.

Shanghai is situated on the Woosung river, about twelve miles above its junction with the mighty Yang-tze-Kiang; the country around is perfectly flat, and the soil alluvial. Although so far south as 31° N. lat., 20° below the south of England, the winter is rigorous, and altogether the climate bears a most remarkable contrast to places in the western hemi-

Sphere situated in nearly the same parallel of latitude *e.g.*, Malta and Bermuda.

The following table shows the average mean monthly temperature of several years past:—

January ...	40° Fah.	July	83° Fah.
February ...	42° „	August ...	83° „
March ...	50° „	September	76° „
April ...	58° „	October ...	67 „
May ...	69° „	November ...	55 „
June ...	76° „	December ...	47 „

During the recent winter there has been at least ten days continuous skating, and the thermometer during the month of January was frequently below 20° Fah. or 12° below the freezing-point. During the last six months there has been an extreme range of 82°, *i.e.* from 99° to 17°.

This subject is well worthy of enlargement and development, but meantime this is perhaps enough for GOSSIP.

SKETCH OF THE GEOLOGY OF DUBLIN AND WICKLOW.

BY WM. HELLIER BAILY, F.L.S., F.G.S.,
M.R.I.A., &c.

THE metropolis of Ireland is most favourably situated with regard to its position, its eastern extremity being bounded by the sea, to the north-east the peninsula of Howth forms the limit of Dublin Bay in that direction, to the south that of Kingstown and Dalkey; south of Dublin the granite range of mountains are a conspicuous feature in the landscape.

Of the igneous rocks, granite, the most important, is well displayed near Dublin, commencing about three miles south, extending in a south-westerly direction for a distance of twenty-nine miles to near New Ross, in the county of Wexford, with an average width of eight or ten miles, and a maximum, at one part, of eighteen miles. It forms the Dublin mountains, rising to an elevation of 1,763 feet from the sea-level, above the Three Rock Mountain at Fairy Castle. The lower hills, near the sea-coast, such as that of Killiney, are 480 feet, and Dalkey 472 feet, in height. The outline of this range shows a succession of gently-undulating and rounded eminences, descending more rapidly towards the sea.

In the adjoining county of Wicklow the mountains rise to a greater height; Lugnaquilla, in the southern part of the county, being the highest, is 3,040 feet elevation, consisting of a mass of mica schist resting on the granite; all the loftiest parts of the adjacent mountains are also composed of mica schist.

The granite may be seen along the coast from Blackrock, south of Dublin, to Kingstown and Dalkey; from the latter place it has a superficial

breadth of about eight miles. From the quarries at Dalkey Hill was obtained the stone used in the construction of the harbour and piers at Kingstown, about 6,000,000 tons being used in the formation of the two breakwaters. A large quarry in the town of Kingstown was also extensively worked for material used in the construction of the harbour and piers at Kingstown; other quarries have been opened on the eastern side of the Three Rock Mountain for supplying stone for building purposes and for flagging.

The Killiney and Dalkey granite is coarsely crystalline, varying somewhat, however, in different places. The Rev. Dr. Haughton, F.R.S., &c., has fully described the Dublin and Wicklow granites in a memoir of the Lower Palæozoic and associated Igneous rocks of the south-east of Ireland. (“Trans. Royal Irish Acad.,” vol. xxiii., 1859, pp. 564, &c.) Veins of a closer and whiter texture, in which the mica is scarcely or not at all perceptible, are frequently found to traverse the granite of this district; it is called *Eurite*, and is evidently intrusive; occasionally it assumes larger dimensions than that of mere veins. Black mica (*Lepidomelane*) is not uncommon in this granite; a remarkable plumose variety of white mica (*Margarodite*) has been found at Ballybrack. In the Dalkey quarries it is not unusual to find perfectly-formed crystals of black quartz in the joints; fine crystals of Tourmaline are also occasionally met with in the granite of Dalkey, and the mineral called *Killinite*, from its having been found in the granite of Killiney and also at Dalkey.

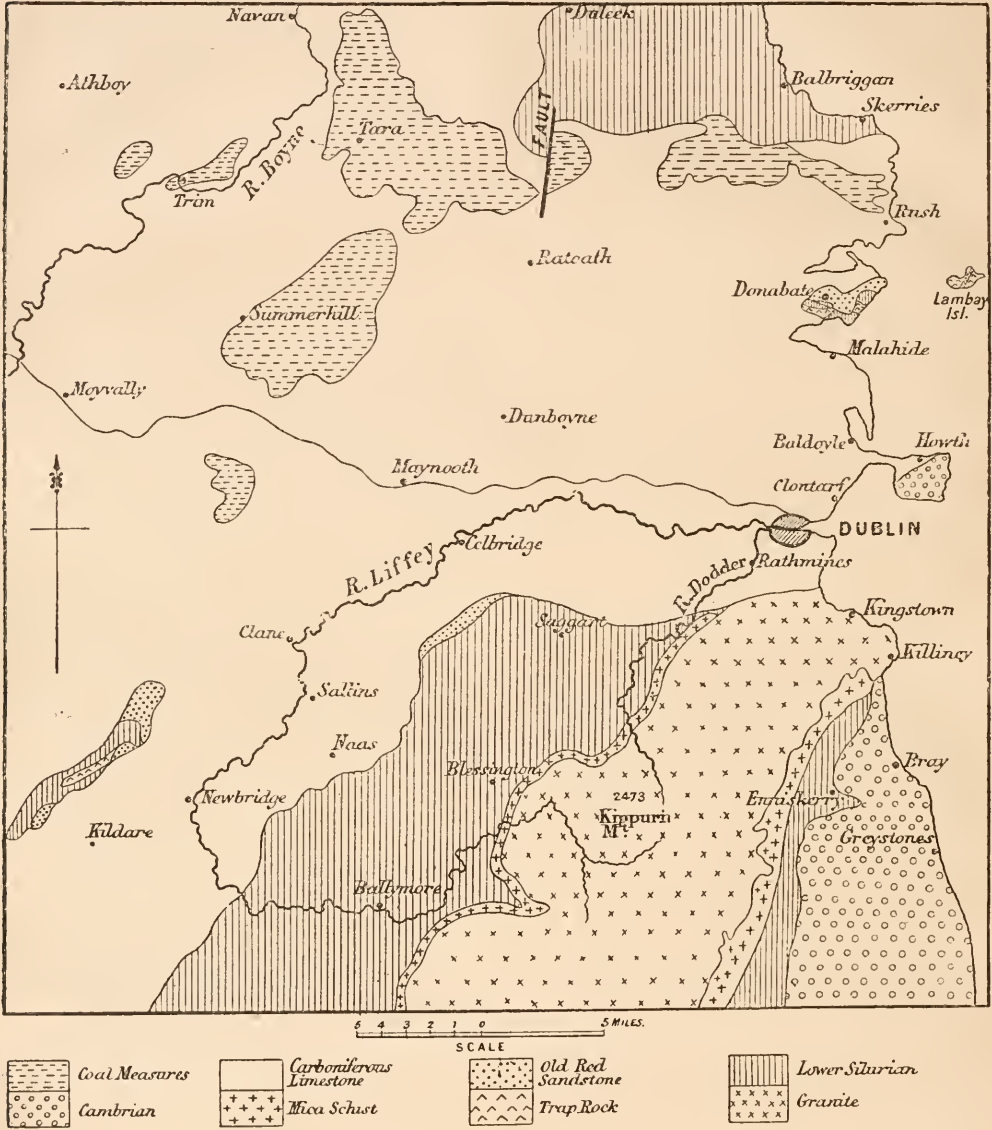
METAMORPHIC ROCKS.—Mica schist, or altered Lower Silurian slates, these again blending into unaltered Lower Silurians, flank the granite from a point near Killiney to near New Ross, in the county of Wexford, spreading out, as shown on the southern boundary of sheet 121 of the Geological Survey maps to a breadth of over four miles. The junction of the Granite and Metamorphosed Slates is clearly observable along the sea-shore under Killiney Hill, at Roche's Hill, and to the west of Killiney Park; in the road and railway cuttings of the neighbourhood; as well as their metamorphism into mica schist, which often contains crystals of chiastolite.

The manner in which the granite has been forced into the slates, penetrating them in wedge-shaped masses and veins, may be observed on the shore at this place. From the Killiney Hills a fine view of the Bay of Dublin, with Howth to the north and Bray Head south, may be seen.

The Scalp, about two miles north of Enniskerry, and about three miles south of Carrickmines station, on the Dublin, Wicklow, and Wexford Railway, is a picturesque pass, the granitic rocks showing great erosion; its junction with the mica schist may be readily observed.

In the glen of the river Dargle, near Enniskerry

Fig. 123.



GEOLOGICAL MAP OF THE NEIGHBOURHOOD OF DUBLIN.

the prominences which are called "the Burnt Rock," "the Lover's Leap," and "the View Rock," are of quartz rock, associated with the Cambrian formation. The well-known Powerscourt Waterfall, nearly 300 feet high, in the same river, is about four miles south-west of Enniskerry, in the Powerscourt demesne, where the metamorphic rocks are prevalent.

Of the stratified or sedimentary rocks the lowest Palæozoic formation is the Cambrian, which is composed of green and purple grits and slates, often

interstratified with masses of dull yellow or brown quartz rock, and having a total thickness of several thousand feet.

Strata of this character form the bold and rugged headland a little south of Bray, rising to a height of 793 feet. The outline of these hills when viewed from the north is very picturesque, with the prominent peaks of the Great and Little Sugarloaf Mountains (formed of quartz rock), in the background. The Great Sugarloaf, four miles south-west of Bray, rising

to a height of 1,659 feet, and the Little Sugarloaf, about two and a half miles south of Bray, to 1,120 feet.

This Cambrian district of North Wicklow, commencing somewhat north of Bray, and including part of the river Dargle, extends to near Wicklow, a length

of seventeen miles, spreading out to seven or eight miles.

At certain places in the district this formation contains a very distinct, though specifically small, assemblage of fossils. Two species of *Oldhamia*

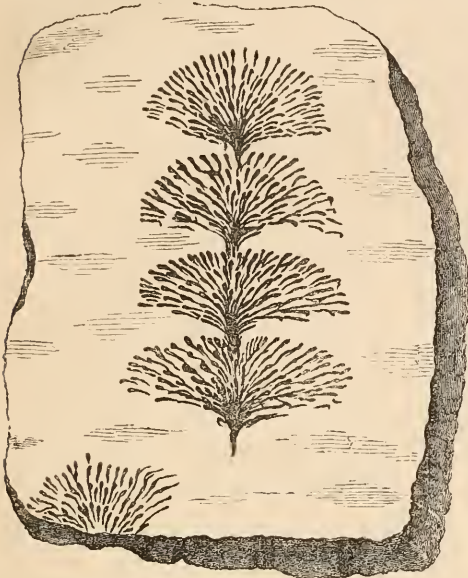


Fig. 124. *Oldhamia radiata*.

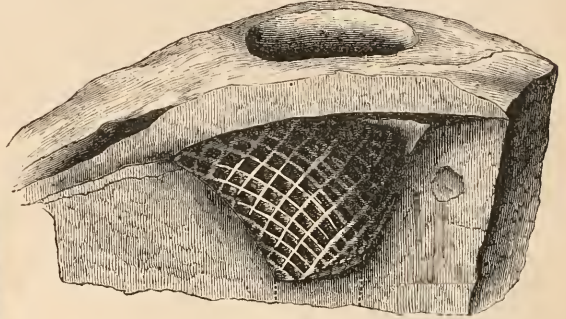


Fig. 127. Burrow of *Histioderma Hibernicum*.

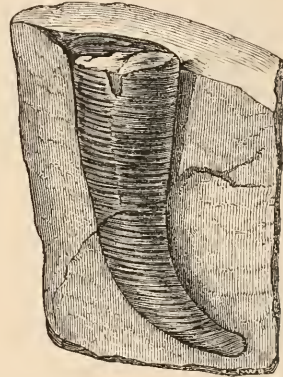


Fig. 128. Extremity of tube of *Histioderma Hibernicum*.

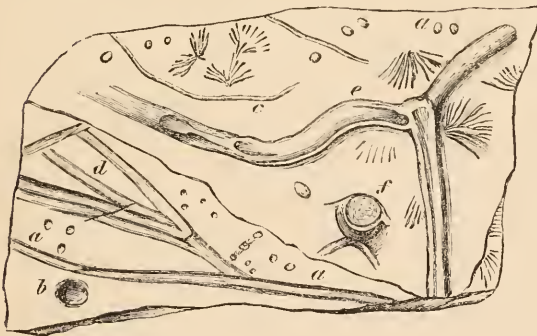


Fig. 125. Tracks and burrows of *Arenicolites sparsus*, copied from Baily's "British Fossils."

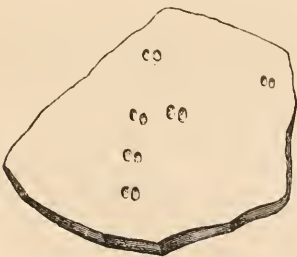


Fig. 126. Burrows of *Arenicolites didymus*.

(named after Professor Oldham), *O. antiqua* and *O. radiata*, have been described and named by the late Professor E. Forbes; they are confined to Irish strata, and occur in considerable abundance at several places in the rocks of Bray Head; at Graystones, on the coast three miles further south; and at Carrick Mountain (1,260 feet high), north of Rathdrum. These fossils were believed, by Professor Forbes and the late Professor J. R. Kinahan, M.D., to be allied to Sertularian zoophytes; other scientific observers consider them to have been plants, probably marine algæ, allied to lime-secreting nullipores.

Accompanying the *Oldhamia* are evident remains of marine annelids, which burrowed in the sand of that period, producing tracks penetrating the beds in a vertical and horizontal direction; they correspond with those described by the late Mr. Salter from the Longmynds as *Arenicolites didymus*, and *A. sparsus* (probably identical species); some of them occur in pairs of double openings, which pass

vertically through the beds; others as tracks running along the surface. Larger tubular casts passing vertically through the beds have been described by the late Dr. Kinahan as *Histioderma Hibernicum*.

At the top of the hill in Kilruddery demesne, belonging to the Earl of Meath, the surfaces of the quartz rock, associated with the Cambrian formation, are distinctly rounded and scored by glacial action.

The Dublin, Wicklow, and Wexford Railway is constructed through this mass of rocks at Bray Head by a series of short tunnels and cuttings, and by bridges or viaducts, exposing sections of strata and exhibiting various geological phenomena.

The Lower Silurian rocks, south of Dublin, are only fossiliferous at a few localities; near Rathdrum, in the county of Wicklow, at Slieveroe, are strata of Caradoc Bala age, from which have been obtained the following characteristic fossils:—*Favosites fibrosus*, *Orthis testudinaria*, *O. actoniæ*, *Leptæna sericea*, and *Euomphalus perturbatus*; the Trilobites *Calymene Blumenbachii*, *Homonolotus bisulcatus*, *Trinucleus concentricus*, and *Beyrichia complanata*.

Cambrian strata are also the prevalent rocks on the peninsula of Howth, county of Dublin; they are associated with quartz rock, as at Bray. The rocks here are more slaty in composition, and the presence of *Oldhamia* is rare; the late Professor Kinahan believed he had discovered it in



Fig. 129. Large Tubular cast of *Histioderma Hibernicum*.

what are called the "Puckrocks," on the shore east of Howth, accompanied by tracks, resembling those observed at Bray; the highest point, Ben Howth, is 560 feet high. In the demesne of the Earl of Howth these rocks are well seen, and a picturesque view may be obtained of the island of Ireland's Eye, which is composed of similar strata, Cambrian and quartz rock. In the further distance may be seen the island of Lambay. The drift at Howth, in the cliffs over Balcadden Bay, is of considerable thickness, containing fragments of marine shells. On the Dublin mountains, at an elevation of

more than a thousand feet, marine shells have been collected and described by the Rev. Maxwell Close from two places ("On the Elevated Shell-bearing Gravels near Dublin," *Journ. Geol. Soc. of Dublin*, vol. iv., New Series, p. 36). At Bohernabreena, near the river Dodder, beyond Fort Bridge, about six miles S.W. of Dublin, marine fossils were also obtained from the drift-gravel and sand by the late Dr. Kinahan (*Journ. Geol. Soc. of Dublin*, vol. viii. p. 87).

The formation upon which Dublin is built, and its immediate neighbourhood, is Upper Limestone; this formation, however, being for the most part covered by drift, composed of sand and gravel.

Sections in railway cuttings, rivers, and canals, and various quarries, show the character of the rock to be a dark earthy limestone, technically termed calp; fossils in this rock are comparatively rare. The Lower Carboniferous Limestone appears at Raheny, continuing to Howth, where it is more fossiliferous. At Balcadden Bay, north-east of Howth, Lower Limestone shale, similar to the rocks forming the low cliffs on shore a little south of Malahide, may be seen. It rests unconformably on Cambrian strata, containing numerous corals, crinoids, brachiopods, &c.

The Limestone at Howth is compact and thick-bedded, frequently magnesian, and occasionally assuming a perfect dolomite.

The picturesque scenery of Howth (reached by a branch of the Great Northern Railway from Amiens-street terminus), is of considerable interest, especially where seen from the road round the east cliff, and through the Earl of Howth's demesne, the more elevated parts (towards the Baily Lighthouse) being nearly as wild in character as some parts of Connemara.

The rocks forming the low cliffs on the shore south of Malahide, Lower Limestone shale, contain an abundance of fossils, corals, crinoids, and mollusca, especially brachiopoda. On the surface of some of the beds, where weathered by sea and atmospheric action, the characteristic coral, *Lithodendron junceum*, may be seen in bunches attached to a large bivalve shell, which was named by Professor McCoy *Pleurorhynchus fusiformis*. The quarries of Lower Limestone near Malahide, at Feltrim, a little to the south-west, and Sea Mount, south-east, has supplied a large number of species.

Still farther north, at Portrane, reached by the same railway from Donabate station, eleven and a quarter miles from Dublin, the prominent rocks are Lower Silurian, of Caradoc Bala age, similar strata also occurring at the Island of Lambay, two and a half miles east.

The beautiful rock called Lambay Porphyry, which forms a large proportion of the Island, composed of pale green crystals of orthose felspar, in a base of a dark green colour, also occurs on the opposite Portrane coast.

The Lower Silurian Limestone on this coast, as at

Lambay, is a very dark and compact grey rock, very fossiliferous in certain places. Corals are abundant, projecting in relief, where weathered. Still farther north on the coast, at Loughshinny, reached from the Rush and Lusk station of the same railway, the Lower Coal Measure shales appear with characteristic fossils, *Posidonomya Becheri* and *Goniatites sphericus*, the first-named shell defining the horizon of the junction beds between the Lower Coal Measure shales and Upper Carboniferous Limestone.

North of this, on the shore at Balbriggan, may be seen black slates, with numerous Graptolites; these are principally single-celled species referred to *G. Hisingeri*. At the Cardy rocks, a little more north, fossils indicative of Caradoc age, are found in brown shales, of which several species have been enumerated.

The great Irish Deer (*Cervus megaceros*) has been found near Dublin, associated with the Reindeer (*Cervus tarandus*); it existed formerly in considerable numbers in this neighbourhood, as in other parts of Ireland. The Bog of Ballybetagh, near Kiltiernan, on the boundaries of the counties of Dublin and Wicklow, has supplied a great many examples of this stupendous animal. Professor Oldham, in a paper read before the Geological Society of Dublin, in 1847* records the discovery of the remains of at least thirty individuals, accompanied by the head and antlers, with other bones of a Reindeer (*Cervus tarandus*), in the cutting for a drain in this bog. Dr. A. Carte, in a paper read before the same society, † gives an account of a skull and antlers of a Reindeer from the Curragha Bog, near Ashbourne, county Dublin (Sheet 101, Geol. Survey Maps). This fine example, in the Royal Dublin Society's Museum was found in a very similar deposit to that previously mentioned, imbedded in marl and clay, under four or five feet of peat. From the peculiar shape of the brow antler, these specimens are proved to belong to the Caribou, or "Barren ground" variety, which now inhabits America between the sixty-third and sixty-sixth degrees of north latitude, in the winter; migrating to the coasts of the Arctic Sea in summer. It is, therefore, very interesting to meet with evidence of the former existence of this variety of the Reindeer in Ireland.

Glacial action is evidenced by scorings of the rocks, which are observable at Kilruddery, Bray, and at Portrane; by the transport of large masses, such as that of granite, on the top of Bray Head, and the distribution of boulders of various formations, in the drift along the railway, near Killiney.

The Eskers of Ireland are frequent over all the low central plain; they are continuous banks of drift, composed of sand and gravel, sometimes fifteen or twenty miles in length, with steep sides, varying from

twenty feet to seventy feet above the general level. One is to be seen three or four miles to the west of Dublin, running from the banks of the Dodder, past the old castle of Tymon, by the Green Hills, to the valley of the Liffey.

Should any member of the British Association visiting Ireland wish to travel further, there are the collieries near Castlecomer, county Kilkenny, and Killenale, county Tipperary, with anthracite coal and numerous fossil plants, &c., in the shales, especially in the collieries near Tipperary; the celebrated old red sandstone quarry at Kiltorcan, near Thomastown, county Waterford, with its well-preserved plant and fish remains; the promontory of Hook Head, county Wexford, where the lower shales of the carboniferous limestone are covered with a profusion of beautiful fossils, and at Sand Eel Bay, close adjoining, the junction between the Old Red Sandstone and carboniferous strata may be seen; the carboniferous limestone between Limerick and Foynes, full of good fossils; the Upper Silurian rocks of the Dingle promontory, county Kerry, more difficult of access, but containing numerous fine fossils; the cliffs of Moher, county Clare, of Coal Measure strata, upwards of nine hundred feet high, looking out upon the broad Atlantic, and the Llandovery strata of Conemara; the Silurian limestone of the Chair of Kildare, with its profusion of fossils and intrusive porphyry, like that of Lambay; the hard chalk "white limestone" of Antrim, capped by basalt, with lias and Rhætic beds, near Belfast and Larne; and the Miocene plant beds, associated with the iron ores in the basalt, near Carrickfergus, and extending over a considerable portion of the north of Ireland.

MICROSCOPY.

A GOOD MOUNTING MEDIUM.—For some time I was at a loss to find a good medium that would fix a metallic or other ring to the glass slide, and at the same time resist the action of thin balsam, that is, balsam rendered thin by the addition of chloroform, benzine, or turpentine. I tried gold size, and allowed the slip to remain for some months to get perfectly hard before attempting to use it. This was moderately successful as far as the turpentine-balsam went, but with the chloroform and benzine it was a complete failure. Marine glue is, of course, entirely out of the question, it being so rapidly and easily dissolved by the two last-named fluids. The only medium I have found, that is thoroughly to be relied upon, is a cement known as "Thompson's Cement," which is made by Messrs. Thompson & Capper, of 4, Lord Street, Liverpool. I give the name and address, as it is important to know where it can be obtained. I have used it now for some time with the most satisfactory results. The balsam, no matter

* *Jour. Geol. Soc. of Dublin*, vol. iii. p. 280 (1848).
 † *Ibid.*, vol. x. p. 103 (1863-64).

with what it is diluted, remains clear and transparent. The ring can be put on the glass slip, the cell cleaned, and be ready for use in a few minutes. I strongly recommend it to the working microscopist.—*John S. Hicks, F.R.C.S.*

VOLVOX GLOBATOR.—We strongly recommend our readers to study an article in the *Popular Science Review* for July, on "Volvox Globator," written by Mr. A. W. Bennett, M.A., F.L.S. The same journal also contains a capital paper by Dr. Wallich, "On the *Radiolaria* as an order of the Protozoa."

MICROSCOPY IN AMERICA.—It is proposed to hold a Microscopical Congress in August next at Indianapolis, at which it is expected that all the leading microscopical societies in the United States and elsewhere will be represented. Perhaps this may be the means of settling many of the vexed questions with which journals devoted to microscopical research are often too full. There is every expectation of the meeting being successful, both in point of numbers, and in the character of the papers to be read.

THE EXAMINATION OF MINUTE LIVING ORGANISMS.—Mr. Dudgeon suggests that living microscopical objects might always be seen, if the objective were enclosed in a brass or other metallic tube, having its lower end closed by a piece of thin microscopic glass coming close up but not touching the object-glass. With this protection, he says, the end of the microscope may be plunged into a small tank filled with water, containing living organisms, and thus the latter may be examined at leisure.

ZOOLOGY.

THE COLOURING MATTER OF BIRDS' EGGSHELLS.—Mr. Liebermann has recently proved that the blue or green colour of birds' eggs is due to a bile pigment which resembles biliverdin in certain respects. The shells frequently contain a second colouring matter—not a bile pigment—which exhibits a characteristic absorption spectrum.

THE MANATEE AT THE WESTMINSTER AQUARIUM.—Those who have the opportunity should lose no time in seeing the Manatee (*Manatus Americanus*) now on exhibition at the Westminster Aquarium. This very individual might have been the one which sat for its portrait in *SCIENCE-GOSSIP* for March, 1876, so true is the illustration. Mr. Southwell's paper of the above date will be now read with greater interest by those who visit the living example. The latter was taken at the mouth of the Essequibo, off the island of Leguan, British Guiana. It was brought on the deck of the *Blenheim* to Glasgow, where Mr. Carrington, the able naturalist of the Westminster Aquarium, purchased it, on the 1st

of July last, and brought it thence to London, in a special truck. The greatest difficulty experienced in its transit by railway was in keeping up the right temperature, which is between 70° and 75°. When the temperature was lower than 70°, the Manatee would resent the reduction by raising itself bodily upright out of its tank. The powerful muscles of its enormous tail, and the extreme buoyancy of its body, would easily enable the animal to do this. It is healthy, eats about two stone weight of lettuces, cabbages watercress, zosteria, ulva, &c., every day; and sleeps in what seems a most uncomfortable posture, arched like a half-bent bow, but still resting on its tail. The last of its tribe as a denizen of English waters was the *Halitherium* of the Suffolk Crag.

PLANORBIS NAUTILEUS (CRISTA).—I have been fortunate enough to find the above minute shell upon the Potamogeton in two ponds, not far from the Viaduct, Folkestone. In one the specimens were more numerous and finer than the other. It is the first time this *Planorbis* has been found in this locality (July).—*H. J. T.*

HABITS OF RAPTORIAL FLIES.—My attention being attracted by a sharp buzzing on the window, I looked, and saw two flies struggling together and rolling over. After a very few moments one of them, an *Empis* I think, flew away, leaving the other, a common house-fly, alive, and apparently little the worse. It walked about, and took a short flight, but in less than half a minute it rolled over, became convulsed, and died almost instantly after. Whether its death was due to the abstraction of the blood, or to the injection of a poison, I cannot say, but the brief attack of the rapacious fly seemed certainly more rapidly fatal than that of a moderate-sized spider.—*J. W. Slater.*

THE MICROPHONE IN NATURAL HISTORY.—Mr. S. D. Bairstow suggests the use of the microphone for the investigation of the phenomenon of stridulation in insects.

MIMICRY IN INSECTS.—At a recent meeting of the Entomological Society the photographs of two species of Orthoptera, allied to *Pterochroa illustrata* and *P. ocellata* were exhibited, in illustration of the doctrine of "mimicry." The above insects are remarkable for their perfect imitation of dead leaves, which is carried out in the neuration of the wings even to microscopic details, as compared with the ribs and veining of leaves.

MOLES AT WORK.—Professor Paley, in a late number of your periodical, says that he never met a person who could aver having seen a molchill cast up. I beg to state that moles have been at work under my eyes on two occasions. So many years have since passed, that I can only say, as to time,

that the process took place in broad day; whereas the mole usually works, I believe, at three or four o'clock in the morning. On one of the above occasions I was walking through a wood, and seeing a disturbance in the ground close to me, I watched it. A mole, in working through the ground, had come upon the root of a tree running horizontally near the surface: it did not suit the animal's convenience to burrow under, and so up he came into daylight. In another minute, however, he was into the earth again on the other side of the root.—*W. H. B. P.*

SCIENCE IN THE PROVINCES.—One noteworthy feature of modern scientific research is the spirited manner with which it is pursued in nearly every city and town of importance in the United Kingdom. Under some name or another denoting the nature of the particular sciences affected, societies, associations, and clubs, are distributed far and near. In most of them we find men whose names are widely known for scientific research, and who frequently act as nuclei around which those gather who love science in some form or another. Many of these provincial societies publish their transactions, in which we often find papers that would do honour to any learned society in London. In natural science prominence is usually and very properly given to papers dealing with the fauna and flora, geology and meteorology of the neighbourhood. The number of societies publishing some abstract or another of their work is increasing, inasmuch that it has been found necessary to establish such periodicals as the "Naturalist," to record the doings of the various Yorkshire societies and clubs; the "Midland Naturalist" doing the same useful work for all societies in the Midland counties. Among other publications of this kind we have lately received, we are glad to note the establishment of another society in Manchester under the name of "The Science Association," the president of which is Mr. Thomas Harrison, F.C.S., and the secretary, Mr. A. Hutton. This association has been founded chiefly to enable working men to meet together for scientific purposes. We wish it every success! The Liverpool Naturalists' Field Club have just issued their "Proceedings" for 1877-78, containing their president's address, and well-written accounts of the excursions and evening meetings. This is one of the oldest of our field clubs, having been in existence eighteen years. It is fortunate in having for its president such a well-known and enthusiastic naturalist as the Rev. H. H. Higgins, M.A. The Goole Scientific Society have also issued their Annual Report, in which we find short, but interesting, and often valuable accounts of the summer excursions; whilst some valuable papers, such as the list of birds observed in the neighbourhood (by Mr. T. Bunker), and another, the flora of the district (by Mr. Birks), have been printed in full. The Hastings and St.

Leonard's Philosophical and Historical Society have published a cheap but full and clear guide to the natural history of the vicinity, in which we find a catalogue of all the mammals, birds, reptiles, amphibians, fishes, mollusca, insecta, crustacea, &c., together with an equally accurate list of plants, phanerogamic, and cryptogamic. The Birmingham Philosophical Society have also issued their "Proceedings" for 1876-77, in which we find more abstruse papers "On the Kinetic Theory of Gases," by the Rev. H. W. Watson; "On Science as an Instrument of Higher Education," by Mr. Hookham; "On the Place of Archeology in Science," by Mr. J. Kenward, &c. We shall at all times be glad to receive copies of the papers or abstracts of meetings of any or all of our provincial societies.

THE BRITISH ASSOCIATION MEETING AT DUBLIN.—This annual congress of science commences its meetings at Dublin on August 14th, under the presidency of William Spottiswoode, LL.D., F.R.S. &c. The following are appointed Presidents of Sections:—*Mathematical and Physical*, the Rev. Professor Salmon, F.R.S.; *Chemical*, Professor Maxwell Simpson, F.R.S.; *Geology*, John Evans, D.C.L., F.R.S.; *Biology*, Professor W. H. Flower, F.R.S.; *Department of Zoology and Botany*, Professor Flower; *Department of Anthropology*, Professor Huxley; *Department of Anatomy and Physiology*, Dr. R. Mc Donnell; *Geography*, Professor Sir Wyville Thomson; *Economics and Statistics*, Professor J. K. Ingram; *Mechanical*, E. Easton, C.E. In addition to the inaugural address there will be lectures by Mr. G. J. Romanes, F.L.S. on "Animal Intelligence," and by Professor Dewar, on "Modern Ideas of Chemical Action." An excursion committee has prepared a guide book to all the places appointed to be visited, so that every object of scientific interest may be brought before the notice of the visitors. We anticipate a great success for the Dublin meeting.

BOTANY.

FERTILIZATION OF OPHRYS MUSCIFERA.—H. Müller has communicated to *Nature* some new facts in connection with the hitherto mysterious fertilization of this plant. In sunny weather, and under normal conditions, the labellum secretes fluid, and a broad, central, longitudinal stripe of its surface is covered with small drops. Of 50 fresh flowers, Mr. Müller found the labellum in 13 covered with such drops; in 25, shining adhering moisture; and in 12 without any conspicuous trace of fluid. The two small shining projections on each side of the base of the labellum were quite dry in all the flowers. In one flower he saw a fly (*Sarcophaga*) sitting on the labellum, and licking the drops. Its head was directed towards the base of the labellum. On Mr. Müller's

approaching, it flew away before having reached the sham-nectaries, and the flower visited by it was found without pollen on the stigmas, and with both pollinia in their cells. Mr. Müller thinks it probable that this fly, if it had not been disturbed by his approach, would have stepped forward on the labellum, and, trying one of the sham nectaries, would have removed one of the pollinia, and perhaps have transferred it to the stigma of another plant.

BOTANICAL NOTES FROM THE ISLE OF WIGHT.
—Some of your readers may be interested in the following botanical notes on specimens obtained in the Isle of Wight early in June. Taking Ventnor as a starting-point, there are a great number of plants to be found, either by rambling through the beautiful landslip between Bonchurch and Lucombe Chine to the Shanklin Copse, or by ascending the steep sides of St. Boniface Down through the Rew Wood, and returning to Ventnor by St. Lawrence and the cliff. In either case, by walking about five miles, the diligent collector will be rewarded with a great variety of flowers—some necessarily common, others of rare occurrence. In the more shaded parts of the landslip I obtained specimens of *Epipactis latifolia*, or broad-leaved Helleborine; *Listera ovata* (Tway-blade); *Ophrys apifera* (Bee Orchis); *Orchis maculata* (Spotted Orchis); *Orchis latifolia* (Marsh Orchis); also, half-withered *mascula* (early Purple Orchis); the *Iris fetidissima*, or Purple Iris; *Chlora perfoliata* (Perfoliate yellow-wort); *Hypericum perforatum* (St. John's Wort); *Anthyllis vulneraria*; *Lathyrus pratensis*; *Hippocrepis comosa*; *Lotus corniculatus*; *Lychnis Flos-cuculi*; *L. diurna*; *L. vespertina*; *Silene inflata*; *Geum urbanum*; *Anagallis arvensis*, *Lysimachia nemorum*; *Ononis arvensis*; *Tamus communis*; *Galium cruciatum*; *Scrophularia nodosa*; *Geranium* (3), *Veronica* (2), *Myosotis* (2); *Epilobium palustre*. These were the plants actually in flower, but I observed many just in bud, or, on the other hand, already faded; among the latter the Garlic had evidently been out in profusion near Lucombe. On the Ivy the parasitical *Orobanche major* (Greater Broom Rape) is found in great quantities; and altogether, during a hurried search, I collected thirty-two different species between Ventnor and Lucombe Chine. From Lucombe Chine a footpath leads over a couple of fields across the Shanklin road to the copses beyond, here I found *Asperula odorata* (Sweet Woodruff); *Tragopogon pratensis* (Goat's-beard); *Cornus sanguinea* (Dog-wood); *Salvia verbenaca* (Wild Sage); *Reseda Luteola* (Dyer's Rocket); *Tormentilla officinalis* (Tormentil); *Fragaria vesca* (Strawberry); *Linum perenne* (Flax), growing in the fields; *Euphorbia amygdaloides* (Spurge); *Cynoglossum officinale* (Hound's-tongue); *Rhinanthus Crista-galli* (Yellow Rattle); *Pedicularis palustris* (Dwarf Red Rattle); *Lonicera Periclymenum* (Woodbine); *Ligustrum*

vulgare (Privet), and other common plants. Returning to Ventnor over the downs, I found *Gentiana campestris* in abundance; *Polygala vulgaris*, or Milk-wort, red, blue, and white; *Gymnadenia conopsea*, or Sweet-scented Orchis; *R. spinosissima*, and the Sweet-briar; *Helianthemum vulgare*, or Rock Rose; *Onobrychis sativa* (Saintfoin); *Thymus Serpyllum* (Thyme); also masses of handsome Foxglove. Starting in the opposite direction, walking through the Rew Wood, I obtained *Ophrys muscifera* after careful search, but almost faded; possibly three weeks' earlier it might be found more easily. The *Habenaria bifolia* (Butterfly Orchis) is plentiful in this wood; *Melampyrum pratense* is common enough; also further on towards St. Lawrence the peculiar *Melampyrum arvense*, or purple Cow-wheat, which is almost confined to the Isle of Wight; *Hypericum pulchrum* also I found here. At St. Lawrence grows *Cotyledon umbilicus*; the rare *Matthiola incana* (or Wild Stock); *Armeria maritima* (Thrift); the rare *Silene noctiflora* (Night-flowering Catchfly); *Fasione montana*; *Humulus Lupulus*. Other flowers I have not given the names of; but, altogether, in two mornings' ramblings I collected over eighty different species. Going somewhat further from Ventnor the Sundew, Asphodel, Bog Myrtle, Bog Bean, and other interesting plants are to be found.—C. Parkinson.

CHEMICAL IMITATIONS OF VEGETABLE DYES.—
In 1868 the manufacture of alizarine from coal-tar refuse was discovered, and thus the madder-dye was artificially imitated, and quite a new industry sprung up. No other vegetable dyes have been chemically imitated, until a few weeks ago, when synthetic chemistry obtained another great triumph, in the production of dyes identical with those of the Indigo plant (*Isatis tinctoria*). The discovery is due to Professor A. Baeyer, the successor at Munich to Baron Liebig. The name of *Indigotine* has been given to this new dye.

ARUM ITALICUM.—This plant has only been recorded from the Isle of Wight, and most of the specimens distributed have been cultivated ones. My attention was drawn to an arum growing near Penzance, by Dr. Ralfs, which he believed was *A. italicum*. It was the first living specimen I had seen, and I found it was the same form I had noticed near Helston, in Penrose Wood, where it grows in considerable quantity. I had put it down as a variety of the common form. I have tried to dry a few specimens but they are most troublesome.—James Curnoch, Helston.

NEW CHESHIRE LOCALITIES FOR RARE BRITISH PLANTS.—*Ophrys apifera*, Sandiway, Mid Cheshire. *Geranium pyrenaicum*, by the roadside, Hartford. *Corydalis solida*, Sutton-by-Aston. *Vinca minor*, Roadside, Over. *Viola Reichenbachiana*, Crowton. *Scrophularia vernalis*, Weaver Valley. *Cystopteris*

fragilis, near *Over*. *Euonymus europæus*, Weaver Valley. *Rhamnus catharticus*, Newton-by-Frodsham.—James F. Robinson, *Frodsham*.

A GLASS-EATING LICHEN.—In reply to Mr. G. S. Boulger, if he carefully looks at my paper he will see that I have mentioned the conditions under which the objects were seen by a Hartnach microscope. If he will refer to Sanderson, Klein, Foster, and Brunton's "Handbook to the Physiological Laboratory," and many other works, he will see the magnifying power is thus expressed:—Fig. A is, I believe, about 450, fig. B about 200, and fig. D about 2 diameters, fig. E being natural size. They were drawn from the growth as it was placed, glass and all, under the microscope without re-agents. The drawings were by the camera lucida and in pencil. The reasons why I concluded that these growths destroyed the glass were these:—1. When they occupy a hole, it is entirely filled by it, no more, no less. 2. The growing processes always fill the radiating furrows. 3. The cellular structure is embossed on the glass. 4. No other explanation is admissible of the formation of the holes. 5. The impressions become confluent, as all areas do where growth commences at different points and continues from the margins. 6. It is known that calcareous, and even silicious rocks, are eroded by the larger varieties of lichens growing on them, as he may observe for himself.—H. J. Johnston-Lavis.

CAREX BUXBAUMII (WAHL.)—This rare plant, which is confined, according to the "Cybele Hibernica," to a very limited station in Lough Neagh, near Toombridge, Co. Derry, had not been seen for many years up to the present one. The last record of its existence occurs in SCIENCE-GOSSIP for July 1st, 1867, in a note communicated by my friend Mr. S. A. Stewart, of Belfast, where we are informed that "two flowering stems were taken away." Although diligently looked for several years subsequently, no trace could be seen of the plant; and in the "Guide to Belfast," published by the Belfast Naturalists' Field Club, on the occasion of the British Association meeting in 1874, we find a fear expressed that it had become extinct. The winter of this year proved a very wet one, and the waters of Lough Neagh consequently rose far above their usual level. This circumstance decided me to go and search for the *Carex*, and endeavour to ascertain whether it still existed, or had become one of the "lost plants" of the British Flora. Several hours careful search, in which I went over the ground almost by inches, resulted, however, to my extreme delight, in the discovery of a fine tuft of the *Carex* adorned with a number of flowering stems. Of these I removed a few, but I left untouched the tuft of perennial roots which appeared in a very healthy condition. This is the fourth occasion on which the plant has been

gathered, since its discovery in 1835 by Dr. David Moore, of Glasnevin, and its scarcity appears to be accounted for by the fact, that in dry seasons the plant may not flower, and as it is only in very small quantity would consequently escape observation.—Thos. H. Corry, *Belfast*.

DRYING PLANTS.—Mr. Buck's excellent article, "How to make an Herbarium," has touched on a subject of great importance to the "SCIENCE-GOSSIP Exchange Club," that of mould in plants which have not been made *completely dry*. How many sighs would be saved to those who, having mounted apparently lovely specimens, find them, a few months after, enshrined in microscopic fungi? If a little longer pressing had been given them this would not have been the case. May I be excused for this appeal to collectors.—F.H.A.

GEOLOGY.

THE GEOLOGY OF WELL SECTIONS.—At a recent meeting of the Geological Society, Prof. Prestwich read a paper "on the Section of Messrs. Meux & Co.'s Artesian Well in the Tottenham Court-road, with notices of the well at Crossness, and another at Shoreham, Kent; and on the probable range of the Lower Greensand and Palæozoic Rocks under London." The well-known boring at Kentish Town in 1856 showed the absence at that point of Lower Greensand, the Gault being immediately succeeded by hard red and variegated sandstones and clays, the age of which was at first doubtful, but which were finally considered by the author to approach most nearly to the Old Red Sandstone near Frome, and to the Devonian sandstones and marls near Mons, in Belgium. The existence of some doubt as to this identification rendered the boring lately made at Messrs. Meux's brewery particularly interesting, and the method of working adopted by the Diamond-boring Company, by bringing up sharply cut cores from known depths, gave special certainty to the results obtained. The boring passed through 652½ feet of Chalk, 28 feet of Upper Greensand, and 160 feet of Gault, at the base of which was a seam, 3 or 4 feet thick, of phosphatic nodules and quartzite pebbles. Beneath this was a sandy calcareous stratum of a light ash-colour, passing into a pale or white limestone, and this into a rock of oolitic aspect. Casts and impressions of shells found in this bed showed it to be the Lower Greensand, whose place it occupied. The boring was carried further in the hope of reaching the loose water-bearing sands of this formation, but the rock became very argillaceous, and, when 62 feet of it had been passed through, the boring entered into mottled red, purple, and greenish shales, dipping at 35° in an unascertained direction. These beds continued through a depth of 80 feet,

when, their nature being clearly ascertained, the boring was stopped. The fossils of these coloured beds, which included *Spirifera disjuncta*, *Rhynchonella cuboides*, and species of *Edmondia*, *Chonetes*, and *Orthis*, show them to be of Devonian age. Thus, the existence of Palæozoic rocks at an accessible depth under London, and the absence of the Jurassic series, as maintained long since by Mr. Goodwin-Austen, is experimentally demonstrated. These facts are of interest in connexion with the question of the possible extension of the coal-measures under the Cretaceous and Tertiary strata of the south-east of England. The beds found at the bottom of Messrs. Meux's boring are of the same character as the Devonian strata which everywhere accompany the coal-measures in Belgium and the north of France, being brought into juxtaposition with them by great faults and flexures. The author refers especially to a remarkable section at Auchy-au-Bois, in the western extremity of the Valenciennes coal-field, which is particularly interesting from its furnishing evidence that the Hardingham coal-field, between Calais and Boulogne, is a prolongation of that of Valenciennes, and because the same strike and a prolongation of the same great fault observed at Auchy-au-Bois through Hardingham would carry the southern boundary of any coal-field in the south-east of England just south of Maidstone, thence passing a little north of London. Hence it is in the district north of London that there is most probability of the discovery of the Carboniferous strata. The extent of country in which shafts could be sunk to the Palæozoic strata will, however, be limited by the presence of the water-bearing Lower Greensand, which probably reaches close to London in the south, reappears in Buckinghamshire and Bedfordshire, 30 or 40 miles north of London, and probably extends some distance towards the city under the chalk hills of those counties and Hertfordshire. The nature of the representative of the Lower Greensand in the boring, and the character of the fossils contained in it, lead the author to the conclusion that in it we have a deposit produced near the shore of the Neocomian sea, here probably consisting of cliffs of Devonian (or Carboniferous) rock. From these cliffs the calcareous material which here replaces the usual loose sands of the Lower Greensand was perhaps derived by the agency of springs; and the shore-line itself must be situated between the south end of Tottenham Court-road and the Kentish Town boring. The sandy beds of the Lower Greensand will probably be found to set in at no great distance to the southward, presenting the conditions necessary for storing and transmitting underground waters. A test boring made by Mr. H. Bingham Mildmay at Shorcham-place, about 5 miles from Sevenoaks, and in which the Lower Greensand was met with at about the estimated depth (450 feet) and furnished a supply of water, seems to confirm these views. At the close of Prof. Prestwich's paper, Mr. Charles Moore, F.G.S.,

remarked that the various deep well-borings around London have abundantly proved the correctness of Mr. Godwin-Austen's inference that the Palæozoic axis of the Mendips is continued beneath the Secondary rocks of the south-eastern counties. Mr. Moore has himself shown that where these Palæozoic rocks finally disappear under the Secondary strata, there are found at the unconformable junction of the two formations a set of deposits indicating the existence of very peculiar physical conditions, and containing an admixture of fossils from very different geological horizons. Hence he was led to inquire whether any trace of similar abnormal deposits might be found in the deep well-borings of London. With this view he set to work at washing some of the materials supplied to him from Meux's well, and studying the minute and often microscopic organisms thus obtained. The Chalk was not particularly examined; but from a single small sample of Upper Greensand he obtained numerous Foraminifera and Entomostraca, including one Cyprid new to science. The Gault yielded 16 genera and over 30 species of Foraminifera, and 20 species of Entomostraca, 4 of which are new, together with many young forms of Gasteropods and Cephalopods. But the chief interest of Mr. Moore's investigations centres in the 67 feet of strata intervening between the Gault and Devonian. In this marly and oolitic-looking deposit he found no less than 85 different kinds of organisms, exhibiting a singular admixture of marine and lacustrine forms of life. Foraminifera are rare, but Entomostraca and Polyzoa are very abundant. Some genera are found, such as *Carpenteria*, *Saccammina*, *Thecidium*, and *Zellania*, of which the range in time is greatly extended by these investigations. The author fully confirms Mr. Etheridge's reference of the beds in question to the Neocomian period, widely as they differ in physical characters from the Lower Greensand strata of the south-east of England. From a careful study of the nature and condition of preservation of the minute organisms, he concludes that the deposits which contain them were formed at first in shallow lacustrine hollows on the surface of the Devonian rocks now lying buried at a depth of 1,000 feet below London, and that these lakes were invaded by the waters of the Neocomian sea, with the deposits of which their sediments were in part mingled, and under which they were finally buried. Prof. Ramsay said that as the South Wales coal-field, the Bristol coal-field, and the Forest of Dean coal-field were basins originally continuous, and only separated by denudation, Mr. Prestwich and himself had agreed before the Royal Coal Commission that coal-fields might exist below the Secondary strata to the eastward. The correctness of this opinion was proved by the boring put down by Mr. Fox at Burford, in Oxfordshire, which reached undoubted Coal-measures. Prof. Ramsay thought that one of these coal-fields might yet be found near London by penetrating the

overlying Secondary rocks. Mr. W. Whitaker, F. G. S., remarked on the difference between the Lower Greensand at the outcrops north and south of London, and the peculiar oolitic limestone found in Meux's well. He regarded the beds at the bottom of the Crossness boring as by no means proved to be Devonian; but thought some of the specimens more closely resembled New Red Marl. He referred to the Loughton section, in which water was got at the base of the Gault, probably indicating the existence of Lower Greensand. He thought that, considering the inverted condition of corresponding strata in France and Belgium, the determination of the direction of the dip of the beds in Meux's well was by no means of great importance. He did not think that the depth of Gault at Shoreham was exceptional, as at Caterham and other points along the outcrop an even greater thickness of Gault had been found. He stated that the Cambridge phosphate-bed, a few inches thick, was found immediately above the Upper Greensand in Meux's well, and pointed out that some doubt existed as to the thickness of the several beds passed through in the boring.

A FOSSIL BIRD.—Mr. J. A. Allen has just obtained a new genus and species of fossil Passerine bird from the insect-bearing shales of Florissant, Colorado, which shows the greater part of the skeleton and the impressions of the feathers. The general features indicate arboreal habits, and well developed power of flight. The name of *Paleocospiza bella* has been given to this interesting Tertiary fossil.

A NEW FOSSIL MAMMAL FROM THE OOLITIC FORMATION OF AMERICA.—The right lower jaw of a small mammal has just been found in the Rocky Mountain regions. Its position was in the Upper Oolitic or Jurassic rocks, where it was found associated with the remains of *Dinosauria*. The name of *Dryolestes priscus* has been given to this newly-discovered mammal, which bears out the evidence of early mammalian life elsewhere by its being marsupial, and allied to the existing opossums. The size of this primitive animal was about that of a weasel. No fossil mammals have previously been discovered in the Oolitic rocks of America.

NOTES AND QUERIES.

REMARKABLE NESTS.—Having noticed two short articles on "Remarkable Nests" in the Notes and Queries, I thought it might not be out of place to add one other which came under my notice this year. While out for a walk late in March, I saw two blackbirds and one thrush fly out of a hawthorn-bush. On looking into it, I found a true blackbird's nest, built of old hay, with a lining of mud, and then relined with hay, &c., again; but, curious to say, it contained three eggs of the thrush; there were no signs of their being crossed. I am sorry to say that I have not since had the opportunity of visiting the nest,

else I might have been able to account for it in some way or other.—*Joseph T. Gumersall.*

HOW DID THEY GET THERE?—On the 17th of June, 1877, I put a few bits of straw into a bottle of water, placed it in the sun, left it there for some time, and had a large quantity of the infusoria. After I had finished with the infusion, I put it into a dark cupboard; it was left there for about seven months, when, wanting some wide-mouthed bottles, I filled this up with water, and left it for a day or two, and when I came I found it swarming with the water-flea. If any of your readers can give me any light on the subject, I should be much obliged.—*E. W. Wilton.*

ORNITHOLOGICAL NOMENCLATURE.—My little boy is beginning to study ornithology, and I have warned him to be very careful that, in his scientific terms, to make his adjectives agree with nouns, &c. In the first week of his study he brings me Morris with *Erythaca rubecula*, and Wood with *Erythacus rubecula*, and asks me to explain. I cannot. Will some correspondent kindly do this for my little boy?—*Robin Goolfellow.*

STRANGE SUICIDE.—The following account appears in a Bedford paper as occurring at Wootton:—A cat belonging to the Vicar of this parish had given birth to four kittens. As she did not seem strong enough to suckle so many it was judged best to drown them. After this she moped and went about in quite a desponding manner. On Thursday, June 20, she seemed worse, in fact half frantic, continually rushing about the house. On a sudden she dashed out of the house, ran across the lawn and plunged into the ornamental pond in front of the house. She was quickly rescued, and a little brandy given her. As she then seemed a little better she was let loose. Later in the afternoon, however, she spied an opportunity to get out of the house, ran again to the pond, and plunging in was drowned before she could again be recovered.

MOLES AT WORK.—In Professor Paley's paper on Earthworms in last month's SCIENCE-GOSSIP this passage occurs: "This is the case with mole-heaps; but I never saw and I never met with any one who could say he had seen the earth actually being thrown up." If the professor is here speaking of moles, surely he knows but little about them, almost every professional mole-catcher carries a spud with which to pounce on any luckless mole seen throwing up the earth. I myself, one day last month, observing a perfectly fresh mole-run, followed it up, and soon had the satisfaction of seeing the earth being thrown up, evidently by a mole; after watching this proceeding for some seconds, I put my heel hard down behind the mole, thereby cutting off his retreat, and dug him out with my walking-stick. Within a quarter of an hour in the same field I served another mole the same. A third, which I saw actively employed in digging, heard me coming and had time to retreat before my foot barred his tunnel. I may mention that the field had been that day sown with turnips and rolled down, so that the moles, as is their custom, were not throwing up what are commonly known as mole-casts, but simply burrowing about 3 inches under ground and forcing up the soil as they proceeded. From this and other evidence I am strongly of opinion that the intelligence of the mole is by many naturalists over-rated; it is by far the easiest animal I know anything about to trap, and although if it does hear you coming it undoubtedly runs

away, yet I think you may very often of a mild summer's evening catch live moles in the way I got mine as narrated above.—*James Crouch.*

CHEAP AQUARIA.—I am glad to hear of your Chicago correspondent's "Carboy;" because it must form an excellent, cheap, serviceable, dark, non-corrosive aquarium, for workshop, schoolroom, or places where appearance is not essential; and must serve well as a supplementary reserve tank or hospital; but is not a carboy unsightly for drawing or sitting-rooms? For small, simple, movable aquaria, I know nothing better than shallow glasses, commercially known as "pastry pans," or "anemone pans." They are made from 6 in. to 24 in. in diameter, varying in depth from 4 in. to 12 in., costing about 6s. 6d. for one 22 in. by 10 in. I must take exception to "H. G. Atwood's" "tin-foil binding" (*SCIENCE-GOSSIP*, p. 167, July, 1878), because metals of all sorts, or any corrosive material are bad for aquaria. Therefore slate tanks are preferable to iron ones, and vulcanite pipes are found best for circulating pipes, stop-cocks, &c., because rust is thus avoided, and the material strong and durable. "Obedience to the laws of service" is of primary importance in aquaria.—*G. S.*

RANUNCULUS ARVENSIS.—The carpels of *Ranunculus arvensis*, which are covered on both sides with conical, straight, or hooked prickles, probably gave rise to the appellation "Devil's claws," one of the common names of this species of *Ranunculus*.—*Ada P.*

ROBINS' EGGS.—It may interest your correspondent, Mr. C. A. Haden, to know that I have taken, or noticed, many clutches of white eggs of robin. This season, I had brought to me six eggs, white, and considerably larger than the ordinary robin's egg, with a query as to what they were, and at once pronounced them to be robins'. I have often had them brought to me by lads as cuckoo's eggs.—*R. Standen, Goosnargh, Lancashire.*

BIRDS SINGING AT MIDNIGHT.—The date given in the April number of *SCIENCE-GOSSIP* is a misprint. I heard the vocal concert on the night of Saturday, the 16th of February, and two following evenings. I had not observed the error until it was pointed out to me by a friend, and purposed correcting it in the next issue.—*R. Standen, Goosnargh, Lancashire.*

THE CUCKOO AT NIGHT.—Early last June, I often heard the cuckoo singing between eleven p.m. and midnight, once as late as eleven fifty, but I never heard his voice in the "small hours," as Mr. A. M. McA. appears to have done.—*J. W. Slater.*

VARIETIES OF THE CAMBERWELL BEAUTY.—In Central to Eastern Europe, this butterfly, which is amazingly common, and always turns up when you want something better, has a decidedly yellow border. In old-flown specimens, the margin is sometimes faded down to a white.—*J. W. Slater.*

FASTING PARASITES.—A friend gave me some living parasites of *Capercaillie* (*Tetrao urogallus*), about seven months ago. I put some in a box, and left them undisturbed till last week, when upon opening the box, I was much surprised to find two were still alive! What can they have lived upon?—*A. A. G. A.*

ORIGIN OF "COLIAS."—In answer to your correspondent's (Haviland) query, respecting *Colias edusa*, I transcribe from the "accentuated list of the British

Lepidoptera," published some years back by Van Voorst, the following at p. 2. "*Colias*, a surname of Venus, from a promontory of Attica, where she was worshipped." "*Edusa*, a Roman divinity worshipped as the protectress of children, and supposed to bless their food (*aleru*, to eat.)" I think the above derivation of *Colias*, a more satisfactory, and, at least, a more pleasing one than the one he gives.—*W. Hambrough.*

"GREEN HASTINGS"!—A day or two since I heard the cry, "Green Hastings"! which I do not remember having heard for some years. When a boy, fifty years ago, it was the usual cry for green peas. Perhaps some readers of *SCIENCE-GOSSIP* can give the origin of the cry, "Green Hastings"!—*W. S. S.*

FLEAS IN COUNTRY QUARTERS.—I wish to mention what seems to me to be a somewhat unusual occurrence. Two members of my family and myself were walking out in the country on the 10th inst., and after having travelled some miles, feeling tired, we seated ourselves upon some trees, in a meadow, which had evidently been cut down some time, as they presented a very bleached appearance. Shortly after we had reached home we made the unpleasant discovery that we had become victims to the attacks of the common flea (*Pulex irritans*), and it was with much difficulty that we were able to rid ourselves of such troublesome and unwelcome pests. There is no doubt in my mind that the insects were occupants of the trees upon which we rested; but the question arises, how they came there. Probably some of the contributors of *SCIENCE-GOSSIP* could throw some light upon the circumstance, which, to say the least, is a rather peculiar one.—*W. W. Ingall.*

DEVELOPMENT OF FROG'S SPAWN.—One of your contributors on this subject finds a difference of results with regard to the same period of time to those of another observer. I think that *temperature* has a great influence on the speed of development; for I gave some frog's spawn to a friend in order that we might observe together; it was from one agglomeration of ova that both the observed batches were taken. He placed his in a warm room, exposed in a window facing south, while I placed mine in a large cold room, facing north-west. His had developed into active tadpoles before mine had altered much, and after this stage his still progressed far quicker than mine, so much quicker, in fact, that I concluded that the rate of development could be very materially altered by temperature.

MUSTARD.—In the article on mustard (p. 36) it is stated that some authors derive *sinapis* from *sino*, to hurt, and *apis*, the eyes. It would be difficult to find an idea more absurd than this, even amongst the wildest vagaries in which etymologists have run rampant. In the first place the *i* in *sinapis* is short, and the *i* in *sino* (or rather *sinomat*) is long; then there is no such word as *apis* meaning eyes (in Greek), and though there is one something like it, which might by a stretch bear that meaning, the *s* is an essential part of that word, and not, like the *s* at the end of *sinapis*, a mere accident. For older forms of the word are *sinapi*, *sinapu*, and *napu*. We may not be able to say how the *si* came to be prefixed, but it is certain that the origin of all these words must be sought in connection with the Celtic and Gaelic root, which the author mentions in the next sentence. For those on the look-out for *primæ facie* derivations, there is one suggested by Mr. Glasspoole's paper, so obvious that it is strange he did not hit upon it, as others have done. Why should not the name of

mustard be derived from *mustum ardens*, in the preparation of which it was used? Suspicious as it may seem at first sight, on deeper examination more will be found in favour of this source than of any other that has been proposed. At any rate, as the slightest acquaintance with etymological principles will show, that furnished by Mr. Glasspoole's pretty anecdote may be despatched to the limbo of all mere prettiness in science—oblivion. For it is subject to two cardinal objections: first, it does not account for the *s* which originally formed part of the word (compare Old Fr. *moustarde*, It. *mostarda*, Sp. *mostaza*); secondly, it commits the serious error of attempting to account for the French name merely as a French word, without reference to the cognate forms in other languages, all of which must have had a common origin. These remarks, though rather different from the ordinary contents of this journal, are not out of place. For there is a *science* of language. The days are past, when it could be said that in etymology "the vowels meant nothing, and the consonants very little," and, if the subject is to be entered into at all here, something more is wanted than merely to copy derivations out of old books.—*W. B. Grove, B.A.*

DESTRUCTION OF INSECTS, &c.—In the February number of SCIENCE-GOSSIP, your correspondent "L. W. G." protests against the robbing of birds' nests; in which protest I certainly join. May I be allowed, in your columns, to protest also against the wholesale massacre of insects? In the same number I read an account of a visit to Sponza's head-quarters, and there I find that the writer pleads guilty to destroying no less than 70 of those moths, while he succeeds in taking 80 specimens of *Quercus*. Moreover, he meets with a brother collector who has taken 120 of the former insect in three nights, and usually takes from 12 to 20 per night. "Some gentlemen 'uv took fourty a noight this season," he is informed by another. May I ask such collectors where this is to end; for surely Sponza is no Colorado beetle to be stamped out! Is science promoted in any way by wholesale destruction? The system of exchange is pleaded as a reason, or rather an excuse, for obtaining duplicate specimens; but the zealous entomologist should aim at something higher than becoming a mere collector, I had almost said destroyer, of insects. In the life of the Scotch naturalist, Thomas Edward, by Smiles, at page 93, I read, "He sometimes lost for a time the object of which he was in search, because he wished to observe its traits and habits. For this purpose he would observe long and carefully before obtaining possession of it. By this means he was enabled to secure an amount of information in natural history, such as no book, except the book of Nature, could have supplied him with."—*H. L. G.*

SEA ANEMONES.—I have kept sea anemones for the last four years with a tolerable amount of success, and have tried various sorts of food for them; such as raw meat, fish, cockles (*Cardium edule*), and mussels (*Mytilus edulis*); but find the last-mentioned agree best with them, as they seldom reject any portion after feeding, which I have found they constantly do after they have partaken of meat, &c. I give them pieces varying from the size of a sparrow-shot to a pea, according to the size of the anemone, every fifth or sixth day. Care must be taken to remove any rejecta or pieces they do not happen to eat, or they will soon decompose, and render the water fetid and thick. I may mention that by attending to this rule, the water in my tank, holding

about fourteen gallons, is as clear as crystal, although it has been over a year in use. Referring to my friend Mr. Edward Horsnail's note on *Sagartia sphyrodeta* (page 16 of the current volume), it may interest some of your readers to know that I have had three specimens of *Corynactis*, variety *Corallina*, undergo spontaneous fission in manner described by Mr. H., and both the parent and offspring are alive and doing well (I had the original specimens from Torquay early last year, since which they have grown considerably). I think this will assist in confirming the opinion expressed by Mr. P. H. Gosse, in his "British Sea Anemones," page 291, as to the increase of this species. I may also observe that I have succeeded in rearing several anemones born in the tank, principally *Bunodes gemmacea*, and they are now, when distended, nearly an inch high, and the disc more than an inch in diameter.—*C. A. Grimes.*

"BUTTERCUP.—*Bous*, cow; *turos*, curd (Greek). Butter is therefore 'cow-curd'; in early times curd was also obtained from goats and other animals."

"TULIP, from the Persian *tulipan*, a turban."

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

C. W. BURGESS.—Your sea-weeds are too minute and obscure to tell with any degree of certainty.

J. W. J.—The plants you sent us from Shanklin contain fossil sponges. That polished is a *Scyphonia*; the other (No. 8) contains a *Ventriculite*. See Taylor's "Geological Stories," page 180, *et seq.* Price 4s. Published by Hardwicke & Bogue, 192, Piccadilly.

DR. R. B.—It is a *Puccinia*, very much like *Puccinia Thezii*. Is it quite certain that the foster-plant is *Lythrum*?—M. M. C.

J. K. (London).—It is the *Cerastium tetrandrum*, although scarcely distinguishable from some specimens of *C. semidecandrum*.

META V.—Your plants are as follows: 1. *Cerastium triviale*. 2. Doubtful. 3. *Chrysanthemum leucanthemum*. 4. *Equisetum arvense*. 5. *Lotus corniculatus*. 6. *Geranium molle*. 7. *Erica cinerea*. 8. *Lyzula congesta*. 9. *Geranium pusillum*. 10. *Malva rotundifolia*. 11. *Polygala vulgaris*. The one marked 2. is too imperfect for identification.

META V.—We should advise you to procure a small book published by Hardwicke & Bogue, "Notes on Collecting Natural History Objects, &c." Price 3s. 6d. This would give you the information desired.

"AN AMATEUR" (Bristol).—You would find Backhouse & Son, York, the best nurserymen. No doubt you could purchase a living plant of *Dionea* (Venus's Fly-trap).

S. E. L. (Penrith).—An excellent specimen of *Nephrodium Fawcettii*—or *Lastrea Fawcettii*, Lowe. It is very uncommon.

J. H. M. (London).—You might have been much wider from the mark. It is *Sagina procumbens*, L.

A. B. M.—The plants enclosed are as follows:—No. 1, Goosegrass (*Galium Aparine*, L.); No. 2, Herb-Robert (*Geranium Robertianum*, L.); No. 3, a Moss (*Polytrichum commune*); No. 4, also a Moss (*Hypnum rutabulum*); No. 5, Creeping Cinquefoil (*Potentilla reptans*); No. 6, *Galium saxatile*.

MR. BUCK sends us a plant gathered on the banks of the Orwell last August, and thinks it is *Lolium temulentum*. It is a much commoner species, namely, *Triticum repens*, var. *littorense*, Schum., or the *T. littorale*, Host, a species according to continental authorities.

A SUBSCRIBER.—Cow's horn may be easily softened and even dissolved in a strong alkaline solution, such as strong soda-lye.

W. HAMBOROUGH.—"The strange little stalked things" are the eggs of the Lace-wing Fly (*Chrysopa vulgaris*), belonging to the Neuroptera.

W. C. C.—Botanical drying-paper may be obtained at Messrs. Spicer's, New Bridge-street, Blackfriars, London.

T. S. S. (Rochdale).—Your plants are; No. 1, Thyme-leaved Speedwell (*Veronica serpyllifolia*). No. 2, Heath Bedstraw (*Galium saxatile*).

C. H. G. (Clifton, Bristol).—Thanks for the specimen of *Geranium*; it is very interesting, and we trust you will again send anything of the kind.

W. HAMBOROUGH.—We are thankful for the Japan honey-suckle, having never before observed it in flower; your locality must suit it well.

G. S. (Kinson, Wimborne).—It is without doubt the variable *Veronica agrestis*; your description at once shows it is not *polita*. It differs very much in habit, &c.

J. C. (Helston).—Thanks for your interesting notes on Scilly Isles; we are unable to state the condition of the bean-leaf. The leaf of elder has been noticed very similarly affected this season. We will try to trace reason, then will write to you.

M. S. (Brentford End).—Although we speak with some uncertainty, yet we should name it *Medicago scutellata*. Could you allow us to look at the pod? This would settle the difficulty.

R. W. (Westward).—It is *Thalictrum montanum*, Wall. and *R. bachi*. The latter is very imperfect, and thus difficult to determine; but it is evidently a good variety of *fluitans*—possibly a new form.

M. J. WILDE.—The stone you enclosed was a fragment of *Basalt*. One of the best books on Conchology is Woodward's "Recent and Fossil Shells," published by Lockwood & Co.

J. P. G.—See an account of the Origin and Spread of the Potato Disease, in the vol. of SCIENCE-GOSSIP for 1873. It begins with the leaf.

B. K.—You had best obtain "Botanical Labels," by J. Robson, arranged according to the London Catalogue, and printed (on one side only, for labels) by Hardwicke & Bogue, 192, Piccadilly, at 4s. 6d.

JOHN HAZARD.—Your cardboard-box reached us in an utterly smashed condition, and it is a matter for curious speculation as to where the caterpillars are!

T. W. B.—No. 1 is not like any diatom we have seen, and we should say it does not belong to that order. No. 2 is *Eunotia diadema*, a form not uncommon in the American subpeat deposits and subalpine gatherings from all parts of the world. The species are, according to Ehrenberg, distinguished by the number of crenations, thus: *diodon*, *triaton*, *tetradon*, *diadema*, &c. The largest number of teeth we have seen is 24. Pritchard (Kalfs) unites them all, and names them *E. robusta*. No. 2 is perhaps *Gomphonema coronatum*; 4, 5, 6, 7, are either sponge spicula or fragments of *Radiolarians*.

EXCHANGES.

WANTED, in exchange for 5-in. bevelled Insect-board, bevelled boards under 2½ in.—W. H. Cheesman, Coolinge, Folkestone.

For either *Nitella translucens*, showing rotation of sap, *Batrachospermum moniliforme* or *Chara aspera*, send well-mounted Slide, or any of the following:—*Cristatella mucida*, *Plumatella repens*, *Hydra fusca*, *Ophrydium versatile*, to M. H. Robson, 7, Clayton-street East, Newcastle-upon-Tyne.

SIDE-BLOWN Eggs for exchange.—Golden Plover, King Plover, Sandpiper, Curlew, Dunlin, Red-shank, Oyster-catcher, Tern, Grey Wagtail, and others.—J. Lancaster, 24, Prince's-street, Carlisle.

AN Injection Syringe and twelve parts of SCIENCE-GOSSIP for 1874, for well-mounted Slides, or offers.—A. Alletsee, 11, Foley-street, London, W.

WILL exchange Fossils (including sponge from the chalk) for British Birds' Eggs or Lepidoptera.—J. Wrangham, 93, Tyrwhitt-road, London, S.E.

WILL give Parasite of Crow, or other insect preparations, mounted in balsam, in exchange for Diatoms, or Insect Eggs, mounted opaque.—J. Horn, 5, Belle-Vue-square, Scarborough.

London Catalogue, 7th edition. Nos. 41 and 1620 given in exchange for 44, 280, 346, 455, 392, 395, 495, 496, 484, 557, 615, 613, 626, 627, 676, 682, 683, 692, 706, 709, 749, 767, 768, 772, 826, 844, 851, 855, 895, 933, 1649, 1659, 1664, 1665.—A. Wheldon, 8, Albion-street, Darlington.

WANTED, autographs of celebrated English or Continental scientists, or letters. No signatures only, but letters, essays, treatises, or writings of interest. Particularly wanted, letters, &c., of J. J. Audubon the ornithologist. In exchange small specimens of our beautiful *Enys picta*, a turtle very suitable for Aquaria, or some of our native moths, or anything procurable by a collector here. For anatomists could procure *Necturus lateralis*, our representative of the Mexican Axolotl.—Address, Chas. Mann, 44, Lake-street, Chicago, Ill.

SEND object of interest, with stamped addressed envelope, for packet of Foraminifera from sponge sand, to E. W. Wilton, 1, Northfield-villas, Leeds.

A FEW Silkworms (will soon spin) for other objects of interest, shells, fossils, &c. Please state how many required.—Mrs. Skilton, Brentford-end, Middlesex.

Viola sepincola offered for 101, 156, 159, 467, 535, 544, 598, 855, 907, 950, 954, 985, 1029, 1059 c, 1115, 1133, 1194, 1212, 1286, 1295, 1319, 1453, 1655, 1672, L. Cat., Ed. 7.—W. H. Beely, 2, Outram-road, Aduldiscombe, Croydon.

Orbiculina, from Bermuda, a beautiful object, well mounted, in exchange for other good slides.—J. Ford, Wood-view, Newbridge-crescent, Wolverhampton.

Acidilium Urticae, *Æc. Ranunculacearum*, and *Puccinia Malvacearum* to exchange for other unmounted micro-fungi.—List to H. J. Roper, 5, Lausanne-road, Peckham, S.E.

FOR Snake's-head Coralline (*Anguinaria spatulata*), unmounted, send stamped envelope and object of interest to W. H. Skan, 15, Brownlow-street, W.C.

WANTED Slides or Material (Triceratium Diatoms and Polyzoa tentacles extended, for well-mounted slides of Alyssum or *Hippocarya rhannoides*).—E. W. Burgess, 35, Langham-street, London, W.

FIRST-CLASS Micro-slides offered in exchange for live Water Beetles—*Dytiscus marginalis*, *Hydrotus piceus*, and *Acilius sulcatus*.—H. Vial, Crediton, Devon.

A QUANTITY of Cambridge Greensand Fossils in exchange for others, especially *Cristatoceras* and *Echinodermis*.—John W. Carr, Union-terrace, Cambridge.

Orchis incarnata and *Linum perenne* for other rare plants.—John W. Carr, Union-terrace, Cambridge.

I HAVE a 4-joint Telescope, draws to 17 in., to exchange for Lepidoptera.—G. F. B., 23, Rosemary-street, Islington, N.

I HAVE eight numbers of *Science for All* (from commencement up to present month), a capital stuffed squirrel, and good nests of Butcher-bird, Yellow-hammer, and Bullfinch.—Wanted, British birds' eggs, IN SETS, side-blown, Lepidoptera or store-box; Natural History books; or offers.—W. Barret Roué, 165, White-Ladies'-road, Bristol.

London Cat., Nos. 31, 102, 162, 185, 273, 277, 295, 296, 464, 634, 515, 560, 609, 865, 1013, 1053, 1123, 1213, 1276, 1318, 1342 b, 1378, 1383, 1411, 1418, 1428, 1462, 1472, 1476, 1527, 1535, 1537, 1538, 1556, 1641, 1657, 1661, and 1666, for 623, 626, 631, 637, 640, 647, 649, 657, 658, 663, 676, 691, 693, 698, 725, 733, 746, 747, 750, 772, 802, 826, 864, 870, 905, 938, 965, 975, and 1007.—Wm. West, Chemist, Bradford.

WELL-MOUNTED physiological specimens in return for any unmounted material of interest.—George Baker, 37, Cross-street, Islington, N.

SEND well-mounted slides of Foraminifera or Polariscope objects for others, or mounting materials. List sent.—E. Atkins, 200, Essex-road, Islington, London.

WANTED, Blackwall's "British Spiders," vol. ii., in exchange for SCIENCE-GLOSSIP from the commencement, 12 vols., bound in cloth; or cash.—Address, James Grant, care of Editor of SCIENCE-GLOSSIP.

WANTED, a pure and clean gathering of *Volvox globator*, (communicate before collecting). First-class slides in exchange.—E. Wheeler, 48, Tollington-road, Holloway, N.

BOOKS, &c., RECEIVED.

"West Yorkshire: An Account of its Geology, Botany, &c." By J. W. Davies, F.L.S., and F. A. Lees, F.L.S. London: L. Reeve & Co.

"The Physical System of the Universe." By S. B. Skertchley, F.G.S. London: Dalby, Isbister, & Co.

"The Creation of Moses and Science in Harmony." By the Rev. Dr. Stewart. London: Elliot Stock.

"The House of Life." By Mrs. Miller. London: Chatto & Windus.

"A Science Primer." By Dr. McVicar. London: W. Blackwood & Sons.

"Phosphates in Nutrition." By M. F. Anderson. London: Baillière & Co.

"Science Made Easy." By Thos. Twining. London: Hardwicke & Bogue.

"A First Catechism of Botany." By John Gibbs. Chelmsford: E. Durrant & Co.

"Popular Science Review." July.

"Land and Water." July.

"Chambers' Journal." July.

"The Country" (New York). June.

"Familiar Science." "

"Potter's American Monthly." "

"Journal of Applied Science." July.

&c. &c. &c.

COMMUNICATIONS RECEIVED UP TO JULY 8TH, FROM:—A. J. R. S.—T. H. C.—J. W. C.—J. C. A.—H. S.—C. P.—F. W. S.—G. T.—J. S.—M. R. W.—C. L. B.—T. W. D.—J. H. L.—J. C.—J. A. K.—J. P. S.—A. B. M.—A. J. R. S.—J. F. R.—J. H. M.—E. E.—E. W. H.—Dr. R. B.—C. P.—J. A. W.—E. W. W.—E. W. A.—J. B. B.—E. M. W.—R. L. P.—C. M.—J. W. J.—J. T. G.—T. H. C.—F. H. A.—Dr. J. S. H.—M. S.—W. H. L.—W. H.—G. P.—G. S.—Prof. P.—A. J. R.—D. D.—F. A.—C. M. B.—B. K.—H. W.—S. C. S.—J. H. R.—W. W. L.—M. S.—J. W. S.—R. A. D.—W. E. R.—H. G. W.—W. B. R.—F. J. B.—G. S.—H. V.—W. H. S.—E. W. B.—J. C. F.—W. S.—C. H. G.—W. C. C.—W. H. S.—E. W. B.—G. F. B.—J. L.—J. W.—W. M. P.—A. P.—J. W. C.—A. A.—G. F. B.—J. L.—J. W.—W. M. P.—J. E. T.—W. B.—W. H. B.—R. S.—A. C.—T. S.—S.—H. J. L.—W. H. B.—P. T.—H. C.—W. H. C.—M. H. R.—G. F. B.—D. W.—J. C.—R. W.—M. J. W.—J. P. G.—W. W.—J. I.—H. J. T.—E. A.—H. B.—G. B.—H. T. S.—Dr. E. de C.—E. B. G.—&c. &c.



NOTES ON CELERY AND OTHER SMALL SALADS.

BY H. G. GLASSPOOLE.



CELERY (*Apium graveolens*) belongs to the Umbelliferae order of plants, and in its wild form is found growing in ditches and marshes near the sea, in Europe and in Britain, where it is known under the name of Smallage; but in this state it is wholly

unfit for food, having a peculiar coarse rank taste and smell, being considered poisonous to man, and is not even relished by animals. Cultivation, however, has transformed this suspicious plant into one of the most agreeable and wholesome of all our esculents. This species of *Apium* appears to have been known to the ancients, for it was reckoned by them as one of the greater aperient roots, and Pliny states that it hath a peculiar virtue against the biting of venomous spiders. There is no account from which we can gather that the ancient Greeks and Romans were acquainted with the method of bleaching this plant, and thus rendering it fit for food. By most of our old herbalists, it is mentioned under the name of Smallage, and only used by them as a medicinal plant. Gerard tells us that the leaves of it boiled in hog's-grease and made into the form of a poultice, taketh away the pain of whitlows on the fingers, and healeth them. Culpeper recommends that the juice of this plant, mixed with honey of roses and barley-water, be used as a gargle by those who suffer with sores and ulcers in the throat and mouth. Bartholomæus Lorn, in his "Botanologia," (published in 1714), mentions that the roots and seeds of *Apium* were used medicinally in his day. This esculent appears to have been cultivated for the table at the early part of the seventeenth century, for John Ray, the celebrated botanist of that period, says that, if this plant is neglected, it will degenerate into its first unpalatable state. We are indebted to the Italians

for the method of its cultivation, and also for its name. Evelyn, in his "Acetaria" (published 1699), says "Sellery was formerly a stranger with us, and not very long since, in Italy itself." He tells us that it is not a distinct species of Smallage, or Macedonian parsley, though, by its frequent transplanting, somewhat more hot and generous, and sweeter-scented. We have, he says, "the best seeds from Italy, whose tender leaves and blanched stalks do well in our sallets, as likewise the slices of the whitened stems, which being crisp and short, first peeled and slit longwise, are eaten with vinegar, oil, salt, and pepper. And for its high and grateful taste is ever placed in the middle of the grand sallet, at our great men's tables and Prætors' feasts, as the grace of the whole board." In our oldest seed-lists we find that two varieties of celery were introduced from Italy under the name of Red and White upright Italian celery. It is stated in the "Monthly Magazine and British Register," for July, 1797, that the seed of a new sort of celery, from the island of Samos, had been introduced into the county of Norfolk, which grew to the height of three feet, and possessed other superior properties. Celery may be grown to a very large size, for Loudon states that, in 1815, a plant was taken up at Longford, near Manchester, which weighed 9 lb. when washed, with the root and leaves still attached to it, and measured 4 feet 6 inches in height. It was of the red sort, perfectly solid, crisp, and firm, and remarkably well-flavoured. There is a variety of this plant called Celerica, or Turnip-rooted celery (*Apium graveolens napaseum*); it is more hardy than the upright varieties: of this the root is the only part used. It attains to a considerable size, especially in Germany, where it is much esteemed, both prepared by itself and in conjunction with other herbs as a salad. It rarely forms an object of cultivation in English gardens. Sir Joseph Banks and Dr. Solander found in considerable quantities, on the coast of Terra del Fuego, wild celery, which appears to be possessed of wholesome

qualities, as it was found a very useful ingredient in the soups for seamen, because of its antiscorbutic properties. Celery contains sugar, mucilage, starch, and a substance resembling manna sugar, which acts as a stimulant. A decoction made from the seed and drunk as tea is often recommended in some diseases by village herbalists. Celery is regarded as a lucky plant by the modern Greeks, and is hung up in rooms, placed on silkworm-frames, and given to children.

The common name appears to have been derived from Italy,—*sellari*, under which it was introduced in the old seed-lists into this country, but it is found in old works, spelt in various ways; thus, Sellery, Celeri, and Celery.

The etymology of the botanical name, *Apium*, appears uncertain. Some authors think it is derived from the Celtic *Apon*, water, from the place where the plant grows; others state it is from *Apis*, a bee, because these insects are fond of it. Celery has quite supplanted our native Alexander's (*Smyrniolum Olusatrum*), which our forefathers used to eat as a common salad.

Among other herbs which are sometimes to be found in the salad-bowl, are the various Valerianella, or Lamb's lettuce. The French call them *Salade de prêtre*, from their being eaten in Lent. Evelyn says they certainly deserve a place among the penitential herbs, for the stomach that has admitted them is apt to cry peccavi. The leaves of Burnet (*Poterium sanguisorba*), when bruised, have the smell of cucumber: in former time this plant was in great repute. A small low thistle (*Picridium vulgare*), is often used in France and Italy, both as a salad and greens. Bon Jardinier says it tastes a little like mutton. The flower of the Judas-tree (*Cercis siliquastrum*) and leaves of the Wood-sorrel (*Oxalis acetosella*), when mixed with other herbs, give an agreeable acid flavour to the salad.

Dr. Thomas K. Chambers, in the "Manual of Diet in Health and Disease," says, "Salads ought to form an important article of diet in every family. The salad ought to be dressed by one of the daughters of the house after she has dressed herself for dinner, singing, with her clean cool fingers, sharp silver knife, and wooden spoon—

"Weaving spiders, come not here;
Hence, you long-legged spinners, hence;
Beetles black, approach not near;
Worms nor snails, do no offence."

The purity of the salad-bowl is also of great importance. In the days of the Tudors the cooks were accustomed to mix their salads in a silver saladier, or some other vessel of metal which was affected by the chemical action of the acids so composing the mixture, and must have proved deleterious to those who partook of it. Evelyn, the great reformer in the art of salad-making in those days, says, the proper material for the salad-bowl should be porcelain, or of Holland delf-ware. We find in the writings of our

old poets and dramatists allusions to salads, as is shown in the following conversation between Lafeu and the Clown in "All's Well that Ends Well":—

"LAFEU. 'Twas a good lady, 'twas a good lady; we may pick a thousand salads, ere we light on such another herb.

CLOWN. Indeed, sir, she was the sweet marjoram of the salad, or rather herb of grace.

LAFEU. They are not salad herbs, you know, they are nose herbs.

CLOWN. I am no great Nebuchadnezzar, sir; I have not much skill in grass."

The author of the "Book about the Table" states that Poetry seized the dish to use it as an emblem of vernal freshness and greenness.

Shakespeare's Cleopatra says—

"My salad days,
When I was green in judgment."

Our forefathers were accustomed to introduce the salad into some of their wise and pithy sayings, for among our English proverbs we find the following:—

"A fool can pick a sallet as well as a wise man."
"He would live for aye, must eat sallet in May."

The following is a translation of a Spanish proverb: "Four persons are wanted to make a good salad. A spendthrift for oil, a miser for vinegar, a counsellor for salt, and a madman to stir all up."

Dr. Doran, in his "Table Traits," tells us of a certain Frenchman who made his fortune by making salads for the aristocracy of England. Chevalier d'Albignac, one of the refugees which the great Revolution had cast on our hospitable shores, where he, like many of his unfortunate countrymen, contrived to subsist on a small pittance allowed him by the English Government, was one day dining with an affluent friend in the coffee-room of a fashionable hotel; he took upon himself to make a salad, and the way he handled and mixed the preparation attracted the attention of a young nobleman who was dining with another party in the same room. The nobleman approached the foreigner, and politely entreated him to mix a salad, French fashion, for his table. M. d'Albignac consented, and made such a one that put the four gentlemen into a state of uncontrollable ecstasy. His complaisance and communicativeness to the young nobleman and his friends had agreeable results, as they did not let the poor Frenchman depart without slipping into his hand a golden fee. A few days after M. d'Albignac received a letter from a certain lord, politely requesting him to repair to his house in Grosvenor-square for the purpose of mixing a salad for a dinner-party he was about to give. The Chevalier obeyed the summons, and after performing his mission returned home, richer by £5 than when he went out. His marvellous salads were soon the talk of the town. The "gentleman salad-maker" was the hero of the hour, and ladies of the highest fashion, we are told,

were heard rapturously commending his "works" in gilded salons, or avowing they could not live another week without devouring one of them. The lucky Frenchman was soon enabled to start his carriage, and might be seen driving from house to house during the dining hours of the aristocracy, attended by a servant, who carried a mahogany case, which contained the various ingredients for concocting his salads, according to the taste of his employers. He opened a shop, where he drove a lucrative trade in sauces and other culinary dainties. Being a prudent and saving man, he managed to realize some 80,000 francs, 60,000 of which he invested in government securities, which stood just then at 50 per cent., and with the other 20,000 he purchased a little estate at Limousin, where he spent the rest of his days enjoying his well-earned fortune.

I conclude by introducing a

Receipt for a Winter Salad, written many years ago, at Castle Howard, by the Rev. Sydney Smith :—

"Two large potatoes, passed through kitchen sieve,
Unwonted softness to the salad give;
Of mordant mustard add a single spoon—
Distrust the condiment which bites so soon;
But deem it not, thou man of herbs, a fault
To add a double quantity of salt.
Three times the spoon with oil of Lucca crown,
And once with vinegar procured from town.
True flavour needs it, and your poet begs
The powdered yellow of two well-boiled eggs.
Let onion atoms lurk within the bowl,
And, scarce suspected, animate the whole.
And lastly, on the flavoured compound toss
A magic tea-spoon of anchovy sauce.
Then though green turtle fails, though venison is tough,
And ham and turkey are not boiled enough,
Serenely full, the epicure may say,
'Fate cannot harm me—I have dined to-day.'"

A HOLIDAY ROUND DORKING.

LIKE most of those who are engaged during the day with the bustle of City life, we were anxiously looking forward to rest and quietude in the country, where we could throw off for a while the routine and formality of business, and enjoy that sense of freedom which only the lover of nature can appreciate.

The longed-for time came at last, and after the usual amount of preparation we arrived at Cannon-street station, and were soon spinning away from dusty London into the more picturesque country. The sun was shining brightly into the carriage, and the atmosphere was anything but cool; but we were in excellent spirits, and such weather led us to hope that we should spend a very happy holiday, being particularly suitable for our chief pastime, entomology. At length we arrived at Dorking station, and everything around looked bright and promising, as we got into the conveyance which was to take ourselves and luggage to the town. We contented ourselves for the remainder of the day with a general survey of the town, which presents the appearance of a thriving but quiet country place.

We were greatly delighted on waking next morning to find that the weather promised to be a repetition of the day before. The first thing for us to do, after having enjoyed a good breakfast, was to settle in what direction we should go, as we were very anxious for the chase, and our nets and boxes were all in readiness. Leaving Dorking at ten, and not forgetting to fill our flasks with lime-juice, we took a friend's recommendation, and started off in the direction of Ranmer Common, distant about two miles. Just past the railway-station, South-Eastern Railway, we found a chalk-pit, and were not long in discovering that some sport was to be obtained therein. Getting over the railings a very bright-blue butterfly was seen; the gauze soon enveloped him, and he turned out to be the *Adonis*, Clifden Blue. He was sadly battered, as it was quite a month late for him, so we gave him his freedom, and away he went, no doubt happy to be released from our clutches. No sooner had we done this than we noticed a dull-looking little insect tripping sharply along, and settling for a moment on the blue flowers that grew in the chalk. This we soon found to be *Alsus*, the Bedford Blue, and we were very pleased to find them in great plenty and very nice condition. After another parting look round the chalk-pit, and having beaten a few blackthorn bushes unsuccessfully, with the exception of taking one *Jacoba*, we went on our way to the road which leads to Ranmer Common. We had been told that parallel with the road was a grassy path, adjoining a very pretty estate called the Denbighs, and that we should very likely have some sport if we went that way, and, moreover, avoid the dust of the chalky road. Immediately we got into this path we noticed the intense contrast which the fresh foliage of the trees afforded from the dry chalk. On our left was a thick plantation of pine and fir-trees, and on our right a hawthorn hedge, separating us from the road, whilst peeping out from the grassy bank was an occasional patch of wild strawberry-plants, some in bloom, and others loaded with the pretty rosy-coloured fruit. This path soon widened into almost a glade, with a wonderful variety of herbage: blackthorn, whitethorn, juniper, clematis, privet, honeysuckle, and almost every imaginable kind of vegetation. The sun was now blazing forth, and we were out of the shade which the pines afforded; moreover, insect life was swarming all around us. The two common skippers, *Linea* and *Sylvanus*, were buzzing about in the utmost profusion; the Meadow Brown, *Mageria*, was lazily flitting from one flower to the other, sometimes with that sombre quiet-looking butterfly, *Hyperanthus*, the Wood Ringlet; everything seemed so quiet and happy, affording such a contrast to the noisy city which we had only the day before quitted. Soon we came to another plantation, and then sport began in real earnest. What is that flying round the top of the pines, and occasionally descending to within reach of the net? We straine.l

our necks trying to capture one, and soon found it such hot work that our coats were off and satchels laid down, whilst F., who was not an entomologist, was not sorry to take a rest by seating himself on the stump of an old tree. Our nets had only got short walking-stick handles, so our chance of success seemed very small at first, more especially as there was a hollow between the path on which we stood, and the ground on which the plantation was situated; if we made an extra effort in our excitement to

of vegetation was wonderful; towering above all was Leith Hill itself, standing out boldly from the clear blue sky, while on the right of the railway could be seen the long ridge of hills in the direction of Guildford. Streams meandered here and there, and the



Fig. 130. Under side Small Blue (*Lycena alsus*).



Fig. 131. Clifden Blue (*Lycena adonis*) upper side of male.



Fig. 132. Small Skipper, female (*Hesperia linea*).



Fig. 133. Upper side of Small Blue (*L. alsus*).



Fig. 134. Large Skipper, male (*Hesperia sylvanus*).



Fig. 135. Small Skipper, male (*Hesperia linea*).



Fig. 136. Large Skipper, female (*Hesperia sylvanus*).

secure our prize, we were thrown from the path amongst the bushes below. But we were not thus to be disheartened, so taking a pull at our flasks, and wiping our perspiring faces, we again set to work. This sort of thing continued for nearly an hour, in which time we obtained about a dozen each of *Pinaria*, and discovered that it was nearly time to return home, without reaching Ranmer after all.

On looking around from the elevated position which we now occupied we were all struck with the marvellous view which presented itself. The railway lay in a valley, and on rising ground beyond stretched the well-wooded district around Leith Hill and Cold Harbour, and the contrast between the various kinds



Fig. 137. Upper side of Ringlet (*Epinephile hyperanthus*).

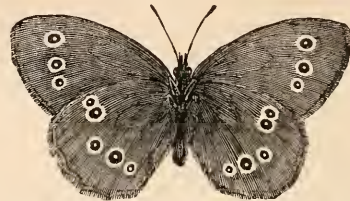


Fig. 138. Under side of Ringlet (*Epinephile hyperanthus*).



Fig. 139. Under side of White Admiral (*Limenitis sibylla*).



Fig. 140. Upper side of White Admiral (*Limenitis sibylla*).

sun shining on them made them sparkle like diamonds. We were indeed glad that we had come to Dorking, for we had never seen a finer piece of landscape before. Moreover, the intense heat, the cloudless sky, and the buzzing of the bees, gave a lazy look to everything around; the cows in the

adjacent meadow were swishing their tails and stamping their feet to release themselves from their summer pests, the flies, and we, too, found them by no means pleasing companions.

Common, and accordingly made arrangements to have a late dinner. This time we took the road, on the right hand side of which was a stone wall, with a plantation above. Flying up and down this was



Fig. 141. Bordered White, male (*Fidonia pinaria*).



Fig. 142. Clay Triple-lines (*Æphyra trilincaria*).



Fig. 143. Small Emerald (*Ionis vernaria*).

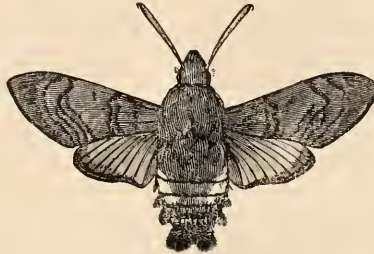


Fig. 144. Humming-Bird Hawk Moth (*Macroglossa stellatarum*).



Fig. 145. Lace Border (*Acidalia ornata*).

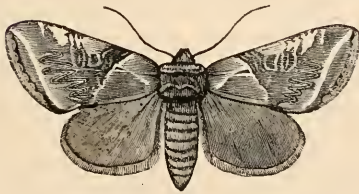


Fig. 146. Buff Arches (*Gonophora derasa*).

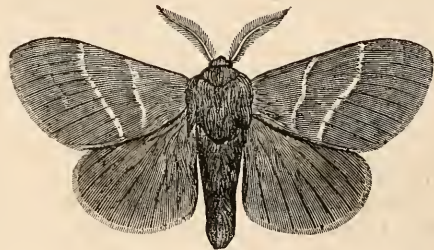


Fig. 147. Fox-Moth (*Bombyx Rubi*).



Fig. 148. Gold Swift (*Hepialus hectus*).



Fig. 149. Chalk Carpet (*Eubolia bipunctata*).



Fig. 150. Chalk Carpet (*Melanippe procellata*).



Fig. 151. Blood-Vein (*Timandra amataria*).



Fig. 152. Bird's Wing (*Dipterygia pinastri*).



Fig. 153. The Gold Spot (*Plusia fiduca*).

In the afternoon we went for a drive to Shiere, a village about half-way between Dorking and Guildford, which we enjoyed very much, after having had a good tea, and partaken very freely of strawberries, which the landlord had just gathered from his garden.

The next day we determined to reach Ranmer

Stellatarum, the Humming-bird Hawk-moth. It gave us a rare chase, with no success, so we made up our minds we would hurry on towards the Common. On arriving at the end of the road, and unfastening the gate, we found ourselves on a large tract of woodland and common, which seemed to invite us to more

closely examine it, which we accordingly did, and set off down a long glade, which made us think it should be called a wood rather than a common. The trees were chiefly oak, with an undergrowth of bramble, honeysuckle, and blackthorn, and on going a little farther in, we came upon a magnificent group of wild foxgloves, all in full bloom, and some of them as much as seven feet high. What was that large golden butterfly which just flew over our heads? exclaimed J. It must be *Paphia*, and sure enough it was, for no sooner had we spoken than back he came, and settled on a bramble, right in front of us, flapping his wings in the sunshine as if making fun at us. For a moment we were speechless with pleasure and admiration, for this was the first time we had seen any of the large Fritillaries on the wing. Then quickly raising his net without letting the shadow intervene, J. gave a swift stroke over, and the silver-washed Fritillary was safely in his net. We did not have to wait long before seeing several others as we went farther down the glade; they all flew very swiftly, and appeared very fresh on the wing, it being only the second week in July. After we had obtained about half-a-dozen each, and having captured a few *Thec. quercus* flying round the oaks, together with some *Trilinearia*, which we beat out of some beeches, we resolved to try the old wall again, and return to the Common next day. On our way back we managed to capture three *Stellatarum*, and then we turned into the grassy path before mentioned. In one of the fields the grass was particularly high, and we thought it not unlikely something might turn up in it. We soon found that we were to be rewarded for our trouble, for we obtained about twenty of that delicate little geometer, *A. ornata*, and also discovered *A. Galathea* in the neighbourhood. We espied the first one, seated on a thistle-head, evidently only just emerged from the chrysalis. This was a very agreeable surprise, as we had neither of us taken *Galathea* before. We took as many as we wanted, and then lay down under the shade of a yew-tree, and watched them bobbing up and down in the long grass. Whilst dreamily passing the time in this way, suddenly something whizzed by like a great bee, and then back again, circling round the meadow in a very giddy way; then it seemed as if making straight for me, so getting my net in readiness, with a swift sweep, I secured it. What could it be? It buzzed up and down the net with great vehemence, and I was very anxious to see it safely bottled in the cyanide. When this was done we found that we had captured *B. rubi*, the Fox-moth, and a very hot chase we had for the other two we secured. We also took a few specimens of *Corydon*, but it was rather early for them, and we knew that each day would make them more plentiful.

In the evening, by beating the neighbouring bushes, we obtained *A. ornata*, *emarginata*, *amataria*, *vernaria*, and *procellata*. The whole of the week

was just as fine as our first day, and on looking over our diaries, we had captured one *Sybilla*, one *Syringaria*, seven *Albicillata*, about twenty *Imitaria*, and nine *Adippe*, and we could have taken as many *Galathea*, *Paphia*, *Corydon*, and *Alsus* as we cared for, not to mention the swarms of Burnet moths and commoner butterflies which frequented every meadow. We tried sugar, but with no success, but by dusking and beating, we had obtained *Chrysitis*, *Urtice*, *Derasa*, *Pinastris*, *Fulvata*, *Pyraliata*, *Didymata*, *Albulata*, *Rubidata*, *Trilinearia*, and several other geometers, whilst, settled on thistle-heads in the daytime, we took a few specimens of *Conigera*.

We had during the week paid a visit to Box Hill, and very much we enjoyed the cool shade afforded by the copious foliage. On arriving at the top a very extensive view is presented, stretching right away to the downs of Sussex, the marvellous variety of woods, rivers, and villages, forming a panorama beyond description. Height 800 feet.

So far we had had wonderful weather, not a drop of rain had fallen, and the same bright prospect was before us when Monday morning came, and we decided to go for a walk in Betchworth Park, about a mile distant from Dorking on the Reigate Road, in which is a magnificent avenue of lime-trees, and we were told that had we come a month earlier we should have found the scent of the bloom almost overpowering.

The river Mole runs through the park. It is a dull-looking stream, moderately wide here and narrow there, deep here and very shallow there. I think most of the fish to be obtained in it are tench, carp, eels, &c., those kinds which frequent muddy still streams. But although the water itself is not very inviting, the scenery along its banks is very picturesque, especially at this particular spot, where the foliage of the park sometimes forms quite a bower over the water. After walking through the park we came out again into the road, and then across some corn-fields in the direction of Box Hill, on climbing the sides of which we were greatly delighted to again find our friends the wild strawberries in plenty, with which we regaled ourselves for some little time, thus we worked round to Burford Bridge, and then home along the road to Dorking.

In the afternoon we went for a drive to the Holmwood, a large tract of common and forest land, south of Dorking, on the Horsham Road, where a camp was being held, the white canvas of the tents standing out boldly against the green of the forest, whilst about every hundred yards we went we came upon a fresh batch of geese, which always greeted us with a quack! quack! or hizz! hizz! In all our rambles on the commons we met with these consequential creatures, who seemed as if they were enjoying themselves while they had the chance. On we went until we arrived at Ockley, and then back along quiet country lanes by Abinger and Wotton.

The nut-bushes seemed loaded with the young nuts, and the banks covered with a profusion of ferns; moreover the woods and meadows adjoining Leith Hill seemed to present an unusually fresh appearance for the time of year. In the evening we tried sugaring in the Glory, a wood almost in Dorking, leading on to the Holmwood; it was, however, no good, but on our way back, flying over the corn, we could have taken as many as we wanted of *Palleus*, besides the following insects by dusking, *Hectus*, *Ocellata*, *Sambucata*, *Thymiaria*, *Albicillata*, and *Adustata*, and flying round an old wall we discovered *Perla* in plenty.

The next day we again went to Ranmer, on our way turning out swarms of *Bipunctata* from every bank. We went down our old glade until we came to a spot where the wood had only latterly been cleared, and which abounded in thistles, teasels, nettles, &c. We sat down for a minute or two to rest, and found that we had discovered a regular stronghold for *Puphia*. They came sailing over our heads and settled on the tallest thistles, and then off again to exercise their wings. This sort of amusement we very much enjoyed; we also took several specimens of *G. rhamni*, and I had the good fortune to take a battered specimen of *Sibylla*. We then went through a gate into a sort of plantation, with waste ground on the right; every fresh step we took turning out a lot of wild rabbits, which were on the path enjoying themselves in the sunshine. On this waste land was a great deal of ragwort, and on inspecting the same we found several larvæ of *Jacobe*, in fact on going a little further the ragwort heads were quite tinted with their orange-coloured bodies. Here we also saw a specimen of *Aglaia*, but we were not able to get near him, a few *T. quercus* only rewarding us. During the week we came several times to the common, and always found some new employment in walking along the glades, sometimes under the shade of the oaks, sometimes penetrating into the thick, and getting ourselves nicely pricked with the brambles, listening to the song of the thrush or blackbird, sometimes hearing the melancholy Coo! Coo! of the ringdoves, or pausing to catch the distant sound of Cuckoo! Cuckoo! All these delights are only to be realized, they cannot be recorded.

Our next visit was to Leith Hill, five miles distant from Dorking, which was particularly enjoyable. We walked to Cold Harbour through wooded lanes, in which the trees sometimes met, forming a beautifully-shaded walk, and being exceedingly picturesque and romantic. Here we had some lunch, and then commenced to ascend the hill. The path is very rough, especially for a pony, which we saw pluckily struggling up. The sides of the hill are covered with a growth of bracken and furze, with an occasional plantation of young fir-trees. On arriving at the top and going up into the tower, a magnificent view presents itself; and it is said that on a clear

day twelve counties are visible. We could distinctly see without the aid of a glass the clump of trees at Chanctonbury Ring, near Worthing. A few children were scattered here and there gathering the whortle-berries which grow on the hill, and from which they say a very delicious jelly is made. Leith Hill is 993 ft. above the sea-level, and is the highest elevation in this part of the country. Like everything else, this sort of thing was not to last for ever, as the time was quickly passing on, and rapidly bringing our holiday to a close; so we resolved to have a good turn at collecting for the two or three remaining days. During this time *Colias Edusa* had been coming out in plenty, and we captured as many as we wanted, flying over the lucerne fields near the railway-station, and amongst them were fortunate enough to come across two *Helice*. I also took one *Ochroleuca* settled on a thistle-head. We obtained moreover *Cardui* and *Rhamni* in fair abundance, besides turning out *Semele* on the dry hill-sides. If we had only had good sugaring we should have had a very successful holiday in an entomological point of view, for novices like ourselves; but we were far from discontented, as the lovely weather and variety of the country would require a very peculiar individual not to appreciate. Our only regret was that we had got through the time allotted to us; and it was with somewhat of chagrin that we said adieu to the shady woods and open meadows, and returned once more to our usual vocation, a great deal the better both in mind and body for our fortnight's holiday.

A. J. R.

LIVE TOADS IN LIMESTONE ROCKS.

I HAVE lately been working geologically among the culm-measure limestones of North Devon, and there I heard the oft-repeated story of a live toad having been disinterred from the solid rock. Unfortunately it was an event of the past, and I did not see either the toad or the rock from which he came. But I can testify to the good faith and general intelligence of my informant, who assures me that he saw the toad, which had just been wantonly crushed by the quarrymen, and that he also saw the mass of rock which had been cleft, and the cavity in which the toad had been. He further assures me that the rock was perfectly solid, without flaw, joint, or perforation of any kind leading to the cavity. He has no reason to think that the quarrymen intended to deceive him, and he himself evidently intends faithfully to describe what occurred.

At about the same time that this information was given me, a similar case was reported to me from the limestone near Totnes, in South Devon. In this instance the quarryman who saw the toad taken from the rock has been well-known to me for years as a steady honest man of superior intelligence. But here again I was not an eye-witness, and can only repeat

what I am told. I am, however, firmly convinced that the man himself fully believes what he reports.

Concurrent testimony, if sought, would be obtained from many independent sources, and yet I find that scientific men are generally disposed to treat such stories with simple incredulity. But surely the phenomenon is worth investigation. No British jury would believe that the quarrymen in all parts of England were leagued together to impose upon the public; nor would any man of science believe that the toads were really imbedded in homogeneous rock. Until a better solution can be offered, I may venture to suggest the following:—

It is well-known that all limestone rocks abound in fissures and joints, which may be and often are filled up with angular debris. At Westleigh, in North Devon, there are many thick beds of breccia alternating with highly inclined and vertical strata, the breccia being just as hard and serviceable as the stratified rock. In some cases where the cementing carbonate of lime has not been coloured,* the two varieties of rock might not be distinguished at first sight, even by a geologist, still less by an ordinary observer. These breccias may be of any post-carboniferous age, and may be still in the process of formation.

We have then only to imagine our toad to have accidentally or purposely got into a fissure, and to have there found himself in what (from a batrachian point of view), we may call comfortable quarters. There, being of a phlegmatic temperament and of sedentary habits, he stood (or rather squatted) his ground, indifferent to the angular fragments which, from time to time, fell around him. Like Horace's "Vir justus ac tenax propositi," of whom it is further said, "Si fractus illabatur orbis Impavidum ferient ruine," so he also was not shaken in his sense of tenant's right by the "wreck of matter" which, in the form of rock-débris, threatened his cranium. Dripping water bearing carbonate of lime by degrees would change his home into a prison, cementing the congeries into the semblance of homogeneous rock.

How long a toad might live under such conditions, I do not venture to conjecture, but the many instances of modern conglomerates, and the stalactites which rapidly collect under newly-built bridges, would argue that the process of forming such a breccia as I have described need not necessarily have occupied many years. I submit, at least, that the independent testimony of quarrymen from many places remote from each other ought not to be set down as mere invention or exaggeration, but should be accounted for as above, or upon some better hypothesis, if such can be suggested.

W. DOWNES.

Kentispeare, near Collumpton.

* It is generally coloured red, owing to the proximity of Triassic rocks.

THE BIRTH OF A ROTIFER.

THE water from which my Rotifer was taken had been standing for some months in one of the marine tanks at the Brighton Aquarium, and was filled with dead mussels. The body, which was surrounded by a single row of filaments, resembled a *Paramecium*, but was longer and not so broad.

The head was blunt, and was beset with strong cilia, amongst which were three or four long filaments. This part of the animalcule was sack-like, and a broad sinus formed the mouth, which was fringed with cilia smaller than those at the margin of the head. A row of globules, about thirteen in number, commencing from near the mouth, extended the whole length of the body, within which could be traced three distinct bulbous sacks, connected by alimentary canals; near the posterior extremity a single dark spot was observed.

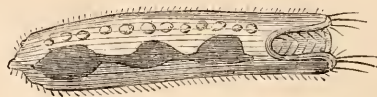


Fig. 154. First appearance of Rotifer.

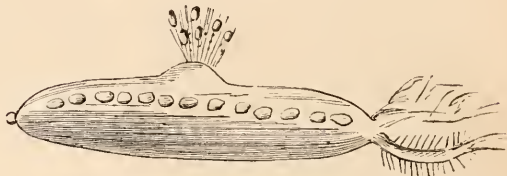


Fig. 155. Rotifer in act of emitting young.

The integument was marked with a fine series of horizontal lines. The animalcule had a peculiar mode of feeding. It first rubbed its gelatinous body against a mass of vegetable matter with which it happened to come in contact, to disintegrate it, as it were, and then pushed its head amongst the débris, grovelling like a pig, and using its cilia to draw the particles into its mouth. On moving the stage, another of the species was brought into the field. The upper part of the head was shrunken and dead, and was almost separated from the body; but round the lower part of the gullet the cilia were in rapid motion. The other part of the body was perfectly quiescent, even to the filaments, and was compressed and colourless. About midway down the Rotifer, a slight swelling commenced, which gradually increased. It then burst, and a violent disruption took place, which resembled a mimic Vesuvius. A jet of water issued from the orifice, followed by six minute, pellucid, oval creatures. Their motion was at first very sluggish, but they soon gained sufficient vital energy to prove beyond all doubt that they were endowed with life.

The young lingered over the body of the mother

for some time, and then, joining a community of atoms no larger than themselves, were lost beyond all identification. The vortex round the head of the parent ceased. The animal slowly dissolved throughout its entire length; and, in a few seconds, became one indistinguishable mass of inanimate matter. Having fulfilled its mission, it ceased to exist, leaving nothing but the integument, which retained its pristine outline.

JOHN DAVIS.

TERATOLOGY OF A CABBAGE-LEAF.

A CORRESPONDENT has kindly forwarded to us a specimen of cabbage-leaf, showing one of the most peculiar malformations we have seen.



Fig. 156. Malformation of Cabbage-leaf: two-thirds nat. size.

The midrib of the leaf has become detached about an inch from the base, and exists as a separate stalk, exactly simulating an ordinary flower-stalk. Meantime the true leaf only just shows in its venation the place where the midrib ought to be, whilst the laminae of the leaf are abbreviated so that the stalk extends nearly a couple of inches beyond the

apex. At the summit of the stalk (or detached midrib) the laminae have again grown, but the two external edges have been fused together in growth, so as to present the appearance of a gamosepalous calyx. We have shown the specimen to several botanists, who had not the slightest idea of its being a malformed cabbage-leaf. The accompanying sketch by Mr. J. W. Buck, B.Sc., is two-thirds the natural size of the specimen. On page 113 of "Vegetable Teratology," Dr. Masters figures and describes a similar malformation in a lettuce-leaf, and mentions the cabbage-leaf as occasionally liable to malformations of this kind. The fruit of the rose, he remarks, is only the dilated end of the flower-stalk, in which the true carpels become imbedded. "Between such a case and that of a peltate leaf with a depressed centre, such as often occurs to some extent in *Nelumbium*, there is but little difference." These malformations thus throw interesting sidelights, not only on the origin of such pseudo-syncarpous fruits as the rose, but also on the peculiar leaves of *Sarracenia*, *Cephalotus*, *Aristolochia*, and others.

HOW TO START A NATURAL HISTORY SOCIETY.

WE have repeatedly been applied to for information how one or two individuals fond of natural science should proceed in starting or founding a society for the furtherance of its study.

We have had some experience in this matter, and can honestly say we know of few organizations which may be made so mutually helpful or so socially pleasant for such a small outlay of money. What Mrs. Glass said of the hare is true of societies of this kind. You must first catch one or two people interested in some department of natural science. There are few towns or districts in Great Britain now where there does not reside some one who is a Fellow of one of the learned societies, and who has so far won his spurs. Such an one is generally willing to act as president, and to throw the weight of his influence into the scheme. The secretary should always be selected on account of the greater interest he takes in science, for we regard a good secretary as really more useful to a society than a president. The meetings of a young society should not be held too often, or there will soon be a dearth of papers. Once a month, in the winter, is quite often enough; and one paper only each night, the rest of the evening being taken up with discussion. It is a good practice to encourage members to bring something at every meeting for exhibition — something which strikes them as singular, and which they do not understand. This practice causes members to look out for objects, and develops the observing faculties. It is also useful in raising discussions and oral descriptions at meetings, and perhaps, eventually, in originating papers.

New societies should not aim too high. Let them accept papers on any subject connected with natural history, and endeavour to raise good discussions on them. The subscription fee should not be too much—never more than half-a-crown or five shillings a-year, or the pocket will affect the members. We have invariably found the most prosperous societies and clubs those which charged the smallest subscriptions. In almost every village, to say nothing of towns, there would be little difficulty in hiring, or even in obtaining free, some school-room, either in connection with church or chapel. Indeed, numerous attended churches and chapels have started scientific clubs of their own, so beneficial has it been found to found a society that will find intellectual work for young men. The rules of a young club should be as few and simple as possible, and as free from penal clauses. At first, it would be as well to think of nothing but mutual instruction in scientific matters. Afterwards, the careful study and cataloguing of the plants, insects, birds, fossils, &c., of the neighbourhood might be considered.

Some very young societies are ambitious early to appear in print, and to publish their own "Transactions" or "Proceedings." This is well enough when there is anything really worth publishing, but even then there are plenty of magazines willing to publish such papers, and able to give them a wider publicity than they could have obtained locally. Young societies soon find printing and publishing very expensive, and it is frequently a source of vexation to the members. This matter, therefore, should be left out of consideration when it is intended to start a new society. If there be any surplus money, let it be spent in purchasing such high-priced standard books or magazines as would perhaps be beyond the pockets of many members, and these could be circulated in the usual manner. We have known successful instances of members specially combining to circulate such books among themselves, in addition to any which might be obtainable from the society's library. The summer excursions should not be numerous—not more than two or three during the season. Half a day will be often found long enough to do a great deal of real good work in. If the society limits its members to the male sex, there is no reason why they should not enjoy the pleasure of ladies during the summer excursions. To conclude, the chief things to be considered are, (1) earnest study (no matter by how few, for the numbers will increase if the original members can only "learn to labour and to wait"); (2) an absence of any pretension to intellectual superiority; (3) an endeavour to make the membership as cheap and inclusive as possible, so as to throw the society open to all classes—the only specification being a love for scientific subjects, even if there be not always the means or the opportunity to cherish it.

"BRUCE," THE MANCHESTER FIRE HORSE.

AT the latter part of the spring of 1864 "Our Bruce" was born; he soon began to show signs of a very promising hunter, of over sixteen hands, and in due course commenced his training for the chase. At five years old he had grown to a beautiful animal, very docile and tractive—his mottled grey coat the pride of the groom and the admiration of his master. "Our Bruce," in the hunting-field, once stumbled, and, in consequence, lost the confidence of his master, who disposed of him to the Manchester Carriage Company. In the early part of the year 1870, he was sold by the Carriage Company to the Manchester Corporation for the fire-engine department, and commenced his duties on the 24th March. His general appearance, and kind, tractable, willing ways were soon noticed by the firemen, and in less than a month after he joined the brigade he was the favourite of the whole establishment, having pretty well the free run of the yard, in which he caused much diversion by his singular and funny ways. He was always full of innocent mischief, and one of his greatest delights was to chase the men about the yard. It sometimes happened that he was let out for a gambol when the children were playing. On such occasions it was most interesting to notice how careful he was in not going too near them. At other times, when the engines were in the yard, he seemed not to forget his early training as a hunter, and would amuse himself by jumping over the poles. When tired, he would lift the latch of the door and go into his stable, and just as easily, after a rest, when the stable-door was closed, he would let himself out again, or knock loudly at the door to attract attention. Near the stable-door there is a water-tap with a revolving handle. "Our Bruce" would turn the handle with ease and help himself to a drink. It sometimes happened that a hose-pipe would be attached to the tap; this would not cause him the least inconvenience; in such a case, after turning on the tap, he would lift up the end of the hose-pipe with his teeth and hold the end in his mouth until he had satisfied his thirst. Many curious anecdotes could be told about our pet: how on one occasion he picked up the end of the hose and wetted one of the firemen who had offended him; how, at a fire, he would stand amidst the greatest noise and excitement, with showers of sparks falling around him, and on his beautiful coat, only to be shook off; and at other times completely enveloped in smoke; but there was no shying or fretting under fire or smoke with "Our Bruce." He seemed to know that he had brought those who would fight that ruthless tyrant fire, and he stood proud and confident that before long he would return home with the victors, when, after being refreshed and groomed, he would again be ready, always first, for the next "turn out."

For nearly six years "Our Bruce" never missed going with the first machine, at the end of which time he was, in consequence of his fine appearance, and our desire to give him a less active duty in his old age, transferred from the fire-engine to police-patrol duty. We did not altogether lose our faithful animal's services, for one of his duties was to attend fires with the mounted police-sergeant (whose name was also Bruce) to keep back the onlookers, which he most effectually did for nearly two years, during which time he was as great a favourite with the policemen, rarely leaving a police-station without an apple, a piece of bread, or some mark of affection.

On the 7th of June "Our Bruce" fell sick; the veterinary surgeon was sent for, who pronounced him suffering from inflammation of the bowels. The usual remedies were applied, and everything was done to relieve his pain and make him comfortable, but to no avail. For three days afterwards he was never left for a moment, night nor day, and at the end of the third day he drew his last breath, surrounded by those who loved him well, and who had been taken by him to the scene of many a hard fight. A *post-mortem* examination was held the following morning to ascertain the cause of death. A stone (calculus) six inches in diameter, weighing five pounds eleven ounces, was taken from his bowels. This was, no doubt, the principal cause of the disease which led to the death of the fire horse, "Our Bruce."

Chief Fire Station, Manchester. A. TOZER.

BRAMBLES ABOUT LONDON.

By Dr. E. DE CRÉSPIGNY, Author of "A London Flora."

"In the days when we went blackberrying,
A long time ago,"

WE knew that blackberries were distinct from dewberries, and no more: happier in our ignorance then, than we now are in our knowledge, that there are blackberries and blackberries; and that *Rubus fruticosus* represents an aggregate of forty species, regarded by collectors as distinct, besides varieties. Of these, twenty-eight species are classed as occurring in the home counties, province III. of the "Cybele Brit." (see Compendium); but to what extent they severally prevail there are at present no records to show. Something, therefore, might be attempted towards ascertaining the range, comparative frequency, and particular habitats of the more uncommon kinds, assuming that the ordinary forms are generally distributed. The difficulty is not so much in being able to find them, as in the ability to appreciate the small and inconstant shades of difference by which many of them are to be distinguished, not only from each other, but also from intermediate forms or variations; because, placed as all are now on the common footing of separate species, we are no

longer at liberty to assign any values to the difference between what were formerly considered species and what sub-species; added to which there is, comparing the London Catalogue with the books, no little confusion with regard to nomenclature. The difficulties in the way of correct diagnosis is only lessened to a certain extent by arranging the species into groups or sections; for unfortunately the lines of demarcation are by no means distinctly defined, and in doubtful cases we are at a loss for fixed rules by which we may be guided in determining to which of the sections our specimen should be referred.

Brambles are arranged in sections as follows:—

i. Suberecti; ii. Cæsii; iii. Glandulosi; iv. Villi-caules; v. Nitidi.

I. SUBERECTI: type, *R. suberectus*. This, found in boggy woods, is a northern plant, and is nearest the raspberry, *R. Ideus*, in habit; it is not found near London, but *R. plicatus* occurs in Tilgate Forest, near Tunbridge Wells, and *R. affinis* has been reported from Epping Forest. We have not met with either species; they may be known by their suberect, slender, terete stems, furnished with a few weak uniform prickles, and glabrous leaflets, which are often arranged in a sub-pinnate manner; that is to say, the terminal leaflets are either ternate with two pair of basal leaflets, or they are quinate with a single pair of basal leaflets, but there is no continuity between the sets. Another characteristic of the group is a distinct white border to the margins of the sepals.

II. CÆSII. Subsection *a*: type, *R. cæsius*. We venture to suggest that the proper position of this group is next in order to the preceding one; with which subsection *a* has very much in common. *R. cæsius* may be regarded as a trailing form of *suberectus*. They are much alike in flowers and fruit, besides other points. *R. cæsius* is readily diagnosed, but when met with in its more robust form it may sometimes be mistaken for *corylifolius*. There are several varieties: *tenuis*, *ulmifolius*, &c. The stems are usually very slender, terete, and glaucous, furnished with many slender unequal prickles; leaves ternate, terminal one often lobed; sepals setose, and clasping the glaucous few-grained fruit. Plentiful by the banks of the Thames about Kingston, and in one form or another not unfrequent on damp, shady ditch-banks, which are seldom cleared or trimmed, at a little distance from the environs. It grows also by the Bave stream in the hollow W. of Wimbledon Common. Subsection *b*: type, *R. corylifolius*. This is a very common and also a very variable plant. Its characteristics, however, are so well marked that it can seldom be mistaken for a bramble of any other section. The stems are terete, although strong young shoots are sometimes obscurely angled; smooth, of a greenish subglaucous hue, somewhat rufous when old, furnished with uniform weak prickles and a few sessile glands; generally

prostrate when unsupported; the leaflets are broad, doubly dentate, serrate, or biserrated, and remarkably imbricated, owing to the lateral pair being sessile, and the basal ones entirely so; rugose above, pubescent below;* sepals ovate and tomentose; petals rotund white, sometimes pale blush (in *purpureus* they are pinkish); the panicle always corymbose; its flowering is both early and prolonged. It

are somewhat elliptical. They may be found on damp shady places and ditch-banks. We have gathered them in a lane between the "Spaniards" (Hampstead Heath) and Hendon.

III. GLANDULOSI. This section will also admit of subdivision. *a. Transition of the prickles into aciculae, setae, and hairs, abrupt;* that is to say, the prickles are clearly distinct from the other appen-

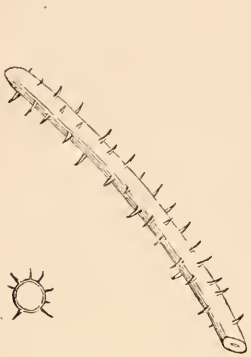


Fig. 157. Portion of stem and transverse section of *Rubus caesius*.

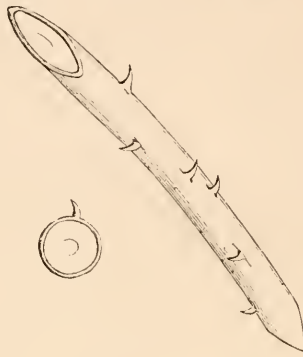


Fig. 158. Ditto of *R. coryifolius*.



Fig. 159. Ditto of *R. glandulosus*.

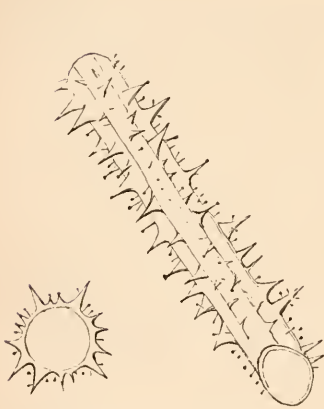


Fig. 160. Ditto of *R. rudis*.

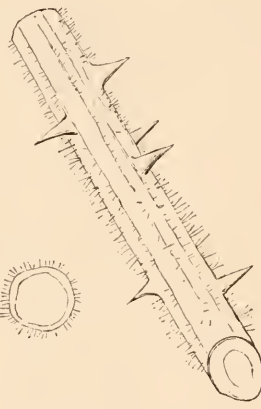


Fig. 161. Ditto of *R. umbrosus*.

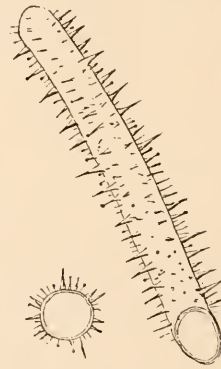


Fig. 162. Ditto of *R. kochleri*.

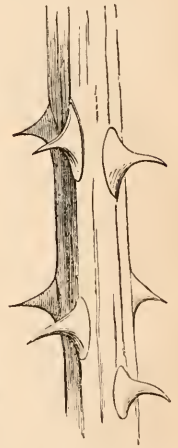


Fig. 163. Ditto of *R. discolor*.

is a common hedge bramble about London. On the Finchley-road, near the station, for instance, and in the lanes leading to Willesden, it is plentiful. The leaves are often ternate by abortion; that is to say, the lateral pair are two-lobed, a peculiarity by no means confined to this species. *R. Balfourianus* and *R. althaeifolius* are straggling forms belonging to this section, with large flat leaves, usually ternate, and large *caesius*-like flowers. In *althaeifolius*, the leaves

dages; type, *R. glandulosus*. Stems subterete, trailing when unsupported; of a dingy dark-greenish or dark-red hue; prickles small, straight, weak; aciculae, setae, and hairs copious; leaves dull and green, slightly pubescent below; leaflets ternate, rarely quinate; of a rhomboidal or ovate form, with biserrated margins; sepals very glandular and furnished with a long acumen; petals narrow, white or pale blush; the panicle broad-topped; pedicels very slender, prickly, and glandular. Frequent in hedges, in the lanes and roadsides about London. *R. Guntheri* is a form of it with large, flat, thin, dark green leaves; leaflets ternate; straggling, decumbent, less prickly stem, and a long, open, leafy, few-flowered

* The pubescence of the under surface of the leaflets is seated on the veins; even when glabrous below the principal veins are never quite free from hairs. In brambles with strong arching stems, such as the nitidi and larger species of glandulosi and villicales, the veins and pedicels are also furnished with small hooked prickles.

panicle; petals similar, but sepals without the long acumen of *glandulosus*. It grows in shady places; abundantly by the palings, northern border of Bentley Priory, Harrow Weald. *R. radula*: not frequent in hedgerows; more generally on the borders of copses in upland situations: on the outskirts of Harrow Weald Common and Pinner Woods, for in.

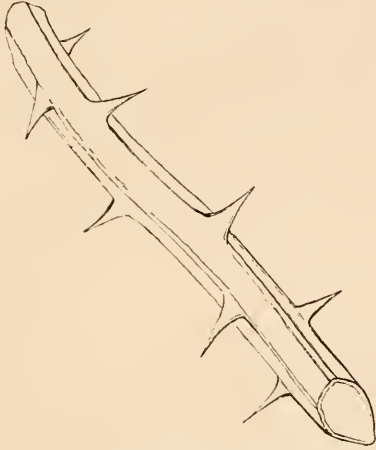


Fig. 164. Portion of stem and transverse section of *R. rhamnisfolius*.

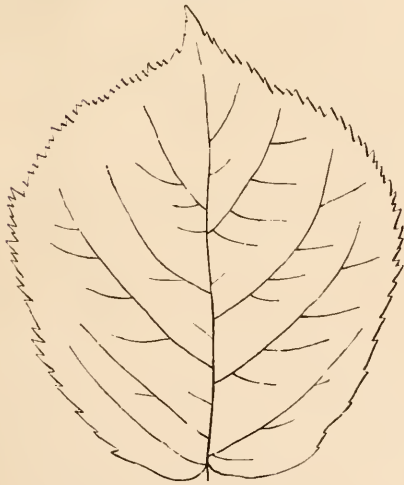


Fig. 165. Leaflet of *R. corylifolius*.

stance. Stems arching, angular, of a dark, purplish hue; prickles strong (or rather, slender, from a strong broad base), nearly equal, patent; setæ and aciculæ short, numerous; hairs few; leaflets dull green, paler beneath; obovate, acuminate, narrow below, sharply and moderately dentate; sepals ovate, reflexed; petals white, obovate; the panicle is rather long, with lanceolate leaves and short corymbose branches; the prickles of the rachis are remarkably deflexed. *R. rudis* differs from the above in having much narrower leaflets, of an elliptical form, felted

beneath, with coarsely serrated jagged margins; shorter panicle; pink petals and sepals furnished with rather broad, leafy points; the prickles are

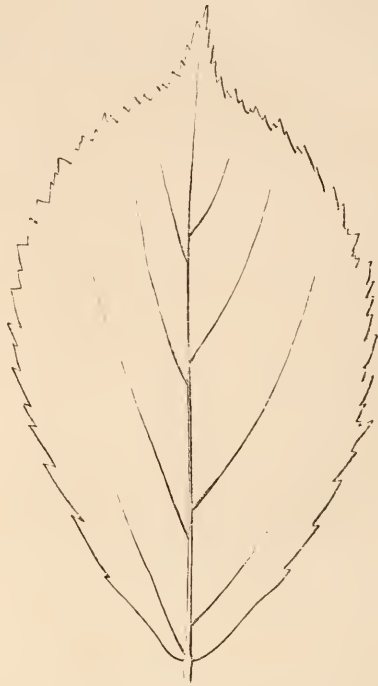


Fig. 166. Leaflet of *R. glandulosus*.

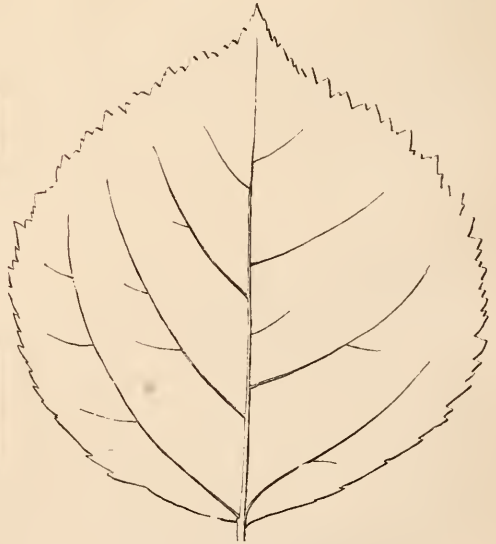


Fig. 167. Ditto of *R. umbrosus*.

conical and slightly deflected. It is of less frequent occurrence than *R. radula*. We have gathered it on Harrow Weald Common. It is probably not very rare. *R. hystrix*: this is a trailing

bramble, with angular prickly stems of a light red colour, abundantly furnished with aciculæ, &c., all shorter than the prickles; the leaflets are of a light grass-green colour, finely serrated and of an oval form; panicle in shape, like that of *radula*; rachis wavy; petals obovate, pinkish; sepals lanceolate, with a long, leafy point. Rare: outskirts of Worm-

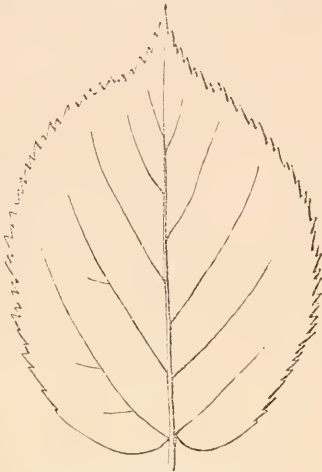


Fig. 168. Leaflet of *R. nitidus*.

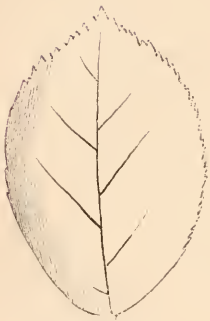


Fig. 169. Ditto of *R. discolor*.

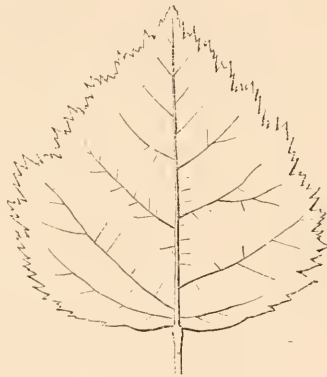


Fig. 170. Leaf of *R. casius*.

ley Wood, Broxbourne. Allied to this is *R. pallidus* (or *rosaceus*), also a trailing but more prostrate bramble than *hystrix*; with bright red stems, and leaves of a lighter green and of a different shape; leaflets obovate acuminate, the terminal one somewhat cordate; the panicle simple and racemose; petals white; sepals ovate, not leaf-pointed. Harrow Weald Common. On Hampstead Heath and on the sandy heaths adjoining the Basingstoke Canal there is a trailing bramble, with an open panicle of pink flowers, remarkably leafy, pointed sepals, and leaflets green on both sides, which would seem to be *R. blexami*. The stems are much less setose than in any other species of this section.

b. *Transition of prickles into aciculæ, setæ, and*

hairs, gradual. Type, *R. Kähleri*.—Stems trailing, terete; abundantly furnished with prickles aciculæ, setæ, and hairs of unequal lengths: this bramble is not very common; at any rate, we have only gathered it in Broxbourne woods: the prickles are slender and patent; the leaflets obovate, coarsely dentate, and scarcely acuminate; somewhat cuneate; pale green beneath and hairy on the veins; panicle, with short leafy corymbose branches; sepals ovate, attenuated, and reflexed from the fruit; petals white, obovate. *R. fusco-ater* differs considerably from the preceding plant: it occurs sparingly on Harrow Weald Common, and is equally unfrequent. The stems are dark purple, bluntly angular, and prickles declining; the leaves ovate acuminate, the basal ones oval; the tothing of the margins subpatent on the stem leaves, finely serrate on those of the flowering branches; leaflets coriaceous, rugose, dull green above, paler below; the panicle long, leafy, narrow, with very short few-flowered branches; rachis wavy; petals pinkish, obovate; sepals ovate acuminate, reflexed; thickly beset with dark purple setæ. *R. nemorosus*, or *dumetorum* (*diversifolius* of the London Catalogue), is a form of *corylifolius* intermediate with this section and the *casii*. The leaves are variable, of the same character as regards imbrication, but the stems, and especially the rachis pedicels and sepals, are abundantly furnished with setæ; the petals, however, are obovate and not contiguous; not narrow, as in *R. glandulosus*; and the sepals not furnished with a long acumen, as in that species. It is also of frequent occurrence in hedges.

(To be continued.)

THE LAND AND FRESHWATER SHELLS OF TASMANIA.

By W. F. PETTERD.

ALTHOUGH the descriptions of many species of the Conchological Fauna of Tasmania have appeared scattered through various scientific publications, I do not think a brief and condensed sketch

of what is up to the present known concerning the land and freshwater shells of this island will be altogether an unacceptable contribution to the columns of SCIENCE-GOSSIP, for I feel assured it must number many among its readers that take an interest in Conchology. My design in writing the present paper is not to enter into elaborate and exhaustive details of the description and distribution of the various species, but to give a general idea of the land and freshwater shells of this far-off land. Tasmania is situated about 120 miles south of the south-eastern corner of the Australian continent; it is 165 miles average length and 155 average breadth, and, exclusive of adjacent small and numerous islands and indentations, has about 700 miles of a coast-line

of diversified aspect, often rugged in the extreme, their beautiful snow-white sands stretching for miles. It is watered by numerous streams, which meander through its wild mountain-ranges and undulating hills that intersect the island, mostly covered with dense vegetation of gigantic trees and almost impenetrable undergrowth. These natural barriers and the physical character of the island, by dividing it into districts, may to some extent account for the extremely restricted localization of many of the species of land and freshwater shells, which is very marked and noticeable to the conchologist, although the dispersion of animal life in the other departments of zoology is not so generally restricted. The marine species have received much attention, and the richness of the Tasmanian coasts is well known among the lovers of nature, comprising, among its numerous members, some of the most gorgeous and attractive of the collector's cabinet. Among the number may be mentioned *Cypræovula umbilicata*, *Voluta fusiformis*, *V. manulla*, *V. papillosa*, *V. Sclateri*, and *V. Augasi*, with the beautiful *Venus lamellata*, *Tryonia margaritifera*, *Phasianella Australis*, and many others of equally attractive appearance.

Recently many new species have been described in the Proceedings of the Royal Society of Tasmania, mostly from dredging operations on the coast, comprising species of genera hitherto unrecorded from this island, and some even from Australia. They include new species of *Murex*, *Trophon*, *Ranella*, *Siphonalia*, *Dentalium*, *Gibbula*, *Cyclostrema*, *Scissurella*, *Marginella*, *Conus*, *Pleurotoma*, *Columbella*, *Conionella*, *Styloptygma*, *Stylifer*, *Rissoa*, *Mytilus*, *Gouldia*, *Kellia*, *Macraschisma*, *Turbonilla*, *Clanculus*, *Diloma*, *Daphnella*, *Fusus*, *Triforis*, *Natica*, *Crossea*, *Liotia*, *Acmæa*, *Callista*, *Myadora*, *Gasterochana*, and a new *Astele*, a genus of Swainson's, described by that talented naturalist when in Tasmania, in the Proc. Royal Society of Tasmania for 1854.

The land shells of Tasmania have received a fair share of attention from Australian scientists, and numerous species have been described by Dr. Cox and Mr. Brazier. The former, in his monograph of Australian land shells, enumerates twenty-two species as from Tasmania; the latter gentleman has many descriptions in Proc. Zoological Soc. of London (*vide* Proc. for June, 1870, &c.), and a general catalogue was published by Mr. Legrand, in 1871, of all the sorts known up to that year. Since then several additional have been described in the Proc. Linnean Society of New South Wales, and Proc. Royal Society of Tasmania. The number of described species now known is eighty-seven, distributed in the following genera: *Bulinus* 2; *Vitrina* 2; *Succinea* 2; *Truncatella* 1; and *Helix* 80; and during my last collecting tour in the northern portion of the island I obtained twenty-two additional species, seven Helices, which are as yet undescribed. The Helices are strikingly different from those of the

mainland of Australia, although I have collected several undescribed species in Victoria with a somewhat general resemblance to some of the Tasmanian species; nevertheless, the general characteristic difference is very distinct and noticeable. The number of species, more especially of the smaller forms, is surprising, particularly when it is taken into consideration that but a very small portion of the island has been searched for land-shells, for the workers in natural history are extremely few in number. I have never, to my recollection, collected in a fresh locality without finding one or more new species, which is certainly a great stimulus for further investigation in this attractive department of science, so that we may reasonably anticipate a great augmentation in their number as the unsearched localities are worked up.

Among the most remarkable sorts may be mentioned *Helix Launcestonensis*, Reese, a fine large and unique form, of a black colour, with a broad yellow band on the under surface. It is confined to the dense myrtle forests in the north-eastern portion of the island, where it is comparatively plentiful about decaying vegetable débris. *Helix lampra*, Pfr., a pretty glossy wild chestnut shell, found generally distributed along the northern coast-line. *Helix lamproides*, Cox, which reaches occasionally the size of *H. Launcestonensis*, and is possibly the *H. bisulecata* of Pfeiffer.

Helix dispar, Brazier, is the only species recorded with a tooth in the interior of the aperture, either from this island or Australia.

Helix vitrinaformis, Cox, a curious form discovered by myself on Mount Wellington, with a peculiar Vitrina-like appearance, and *Helix Weldii*, Tenison Woods (Proc. Royal Soc. of Tasmania, 1877), a very interesting minute shell from Circular Head, as it is the only reversed Helix recorded from Australasia. The majority of the remainder comprise a group of small Helices very different from those of any other part of the world, of which only three species have been ascertained with any certainty to be common both to the mainland and Tasmania; viz., *H. Sydneyensis*, Cox, which is abundant in cellars and such-like places in Sydney, New South Wales; Auckland, New Zealand; and similar localities in Launceston and Hobart Town. It may possibly be the European *H. cellaria*, introduced by some means. *H. Alexandra*, Cox, which is abundant in gardens about Sydney, New South Wales, and like localities around Hobart Town. This I consider the acclimatized *H. costata* of Europe. The other is *H. Nortii*, Cox, which is generally distributed through Southern Australia, and may have been brought over by accident with plants, or by some such means. The identification of this species is somewhat doubtful, for I think, upon careful examination, the Tasmanian specimens will prove to be a distinct species.

Of the *Bulimi*, *B. Dufresnii*, Leach, is a unique form, distantly represented by *B. Angasianus*, Pfr., in Australia. It is widely distributed, and varies much in general coloration and size. The larger specimens are found in the dense jungle, and the smaller dwarf varieties in the more open and dry parts.

B. Tasmanicus, Pfr., is allied to *B. Kingi*, Gray, of King George's Sound. It is distributed around the northern and eastern coasts, always near the sea, clustering on trees and rocks, almost invariably in considerable abundance.

Vitrina Milligani, Pfr., is one of the finest species of the genus; it is of a beautiful shiny black colour, and is truly the gem of the land shells of the island, for its remarkable colour and size render it very attractive. It represents in Tasmania *H. attramentasia* of Victoria, Australia, and *H. Bushyi* of New Zealand. The animal is of a bright and showy red colour. It is confined to the western portion of the island, where it is tolerably plentiful in the dense fern scrubs, particularly about the Duck River.

V. Verreauxi, Pfr., the only other species, is generally distributed, and reaches a somewhat large size in favourable localities. I obtained a species in Gibb's-land, Victoria, bearing a close resemblance to this shell.

Like the land species, the fresh-water are very local in their distribution, almost every creek and mountain-stream affording a distinct species. The Rev. J. T. Woods, in a paper read before the Royal Society of Tasmania, enumerated 32 species; that is to say, 28 univalves and 4 bivalves, belonging to the following genera:—*Physa*, 12; *Limnea*, 4; *Bythinia*, 7; *Ancylus*, 2; *Pomatopsis*, 1; *Planorbis*, 1; *Assimineia*, 1; *Unio*, 1; *Pisidium*, 2; *Cyclas*, 1. More recently he has described a species each of the genera *Valvata* and *Ampullaria*. Mr. Brazier, in the Pro. Linnean Society of New South Wales for 1876, describes two species, which he places in the genus *Ammicola*,—*A. Petterdiana* and *A. Simsoniana*, and he has also described, in the Pro. Zoological Society of London, two species which he assigns to the genus *Paludestrina*.

The *Physa* and *Limnea* are of the ordinary forms, having mostly close representatives in the mainland of Australia; and the same may be said of the remainder, with the exception of two, viz., the *Ancylus*, *A. Cumingianus*, Bourgingnat, a remarkably fine and pretty species,—in fact, the finest of the genus known up to the present time. It is peculiar to the Upper Derwent River, in the southern portion of the island, and is without doubt the most remarkable and interesting of the fresh-water shells of Tasmania. The other is a small shell, which the Rev. J. T. Woods has placed in the genus *Ampullaria*, to which genus it very doubtfully belongs, for, in all probability, upon close examination of the animal, it will be found to require a sub-genus, if not an entirely new

genus, for its reception. The specimens were collected in a creek on the northern coast of the island. Several species still remain undescribed, and no doubt, as further investigation proceeds, many more novelties will be brought to light in this highly interesting portion of natural science; as it is, the number of species now known is great for its comparative small size. Still, much remains to be done before we shall have a complete and exhaustive knowledge of the land and fresh-water shells of Tasmania. Should this short and rough sketch prove of interest to the readers of SCIENCE-GOSSIP, I shall be only too happy to contribute something more concerning the conchology of Australasia.

MICROSCOPY.

AN IMPROVED WAX CELL.—The following plan of mounting in wax is a modification of that suggested by Professor H. L. Smith, of New York (SCIENCE-GOSSIP, December, 1876). To my mind it possesses two great advantages over that of the professor, being cheaper and more easily accomplished. Into the centre of a clean glass slip place one of Pumphrey's vulcanite rings, and into this put a few chips of white wax; then hold the slip over the flame of a spirit-lamp until the wax is melted, and set aside to cool, taking care that the ring does not slide out of position. When well set the wax will be found to have formed a capital cell on the inside of the ring, and to have filled up the angle formed by the outside of the ring and the glass slip. This form is meant essentially for opaque objects, but it can be easily made available for transparent mounts by placing the slide upon the turntable, and with a broad-pointed scalpel turning out the centre of the wax cell. An exceedingly neat opaque mount is made by filling up this central space with asphalt or other black varnish whilst it rests on the turntable. To fix the cover-glass, rub the end of a piece of warm wax round the upper surface of the vulcanite ring, when sufficient will be found to adhere for the purpose; place the cover in position, and pass a heated iron round the edge, and the whole process is complete. In this way a great many objects may be mounted, ready for the cabinet, at a single sitting, which for neatness, durability, and simplicity of construction are unrivalled.—*H. C. Crew, Netherton.*

QUEKETT MICROSCOPICAL CLUB.—The 13th annual meeting of this flourishing society was held at University College on July 26th, Henry Lee, Esq., F.L.S., President, in the chair. The report of the committee briefly reviewed the work of the past year, and congratulated the members upon the continued prosperity of the club in every department of its work. A large number of books had been added to

the library, 185 slides had been presented to the cabinet, the meetings had been well attended, and many valuable and interesting papers had been read. 49 new members had been added to the list during the year, making the present number 562. The treasurer's statement of account was also presented to the meeting, and showed the satisfactory balance in hand of £106. 13s. 5d. The president then delivered the customary annual address, taking for his subject "The commercial application of the microscope," in the course of which many interesting instances were cited to show how the skilful application of the microscope had proved of great value in the settlement of important questions of social and commercial interest. Much good counsel was also given to the members as to the future usefulness of the club, and a well-merited tribute was paid to the honorary secretary, members of the committee, and officers, to whose efficient discharge of their various duties so much of their success was due. Votes of thanks were unanimously passed to the president and officers of the society for their services during the past year, also to the council of University College for continued permission to meet in that building; and an announcement that a donation from the funds of the club of twenty pounds had been voted towards the building fund now being raised for enlarging the college, was received with cheers. Some further interest was also excited by the presentation of a valuable gold watch to Mr. R. T. Lewis, as a mark of appreciation of his services as honorary reporter since 1866. Dr. Harkness, of San Francisco, having been introduced to the meeting as a distinguished foreign visitor, was requested to convey the greeting of the club to the microscopical society of San Francisco, and briefly acknowledged the compliment on behalf of himself and his colleagues. The result of the ballot for officers and council for the ensuing year was as follows:—President, Professor Huxley; Vice-Presidents, Dr. Matthews, Messrs. Henry Lee, C. Stewart, and T. C. White; Treasurer, Mr. Gay; Secretary, Mr. Inghen; Foreign Secretary, Dr. M. C. Cooke; and to fill four vacancies on the committee, Messrs. F. Crisp, A. D. Michael, E. T. Newton, and F. Oxley.

A THEORETICAL LIMIT TO THE APERTURES OF MICROSCOPICAL OBJECTIVES.—At a recent meeting of the Royal Microscopical Society, Professor Stokes read a paper on the above subject, in which he showed that theoretically a pencil of rays from a radiant in glass (or under equivalent conditions) of 180° could be refracted by a single refraction at a spherical surface so as to present to the second lens a pencil of about 81° free from spherical aberration; and, while not asserting the possibility of utilising the whole of the pencil of 180° in glass, he thought a very large part of it might be available in a practical construction,—a far larger part than can be used in dry lenses.

ZOOLOGY.

BIRDS' EGGS IN WRONG NESTS.—The circumstance mentioned by Mr. Sharpe in the number for July must be very unusual. Last year, on May 9th, I found a blackbird's nest with three blackbird's eggs and a thrush's; the blackbird was sitting, but I do not know if they were hatched off. In April, 1873, I found a coot's nest near St. Albans with seven coot's eggs and one moorhen's. On going again a few days afterwards I found an eighth coot's egg and a second moorhen's, with the coot sitting on them. These are the only instances I can recollect to have met with of one species of bird laying in another nest, besides the ordinary custom of the cuckoo, during several years' experience of birds'-nesting. Single eggs of various birds, partridges, thrushes, and black-birds, more especially, are frequently found dropped on the ground, probably either because the bird has not finished its nest in time, or else because its nest has been torn out. In pulling out an old partridge's nest some years ago, from which all the young birds had run (by the way it was, as I should say they usually are, rather elaborately concocted of dead leaves, grass, &c.); in the materials I found an egg which had evidently been laid while the nest was in making, and had been covered up so effectually by the lining that it was added. I have also a red-start's egg which my brother found in a corner of an old tree, between the trunk and a branch, where it had evidently been dropped for lack of a nest. Very probably the starlings not having a nest of their own ready, made use of their neighbour's from the same cause.—*A. F. Griffith, Cambridge.*

APPEARANCE OF PAPILO MACHAON.—On the 25th of June, 1876, the weather was warm and fine. At noon on that day *P. Machaon* made its appearance out of the pupa; the wings were developing at the time. Another machaon emerged from the pupa just before 8 a.m. on the 25th June 1878; its wings were fully developed; the weather was warm and fine. Both imagos emerged on the same day of the same month in different years. This may be of interest to those who notice the influence of insects. The usual month for its appearance is May.—*R. A. Dent.*

TESTACELLA HALIOTOIDEA I have lately found in considerable abundance in my garden; they are generally found whilst turning up the ground. The nearest recorded locality I believe to be Taunton, in Somerset. I have some in confinement, and have been watching their habits, which are very interesting.—*H. T. Johnston-Lavis, Stalbridge, Dorset.*

BOTANY.

THE PRONUNCIATION OF SCIENTIFIC NAMES.—Cordially agreeing with the principles laid down by Mr. Charles Browne, I only write once more on this subject with reference to three names mentioned by him

—*Veronica, Clemátis, and Gladiólus.* Not presuming to give an opinion as to the origin of the legend and name, or name and legend, of the saint who bears a name derived from the Latin *vera* and the Greek *éikon*, I venture to think it highly probable that, as a plant-name, Veronica is simply a corruption of *Betonica*, and is therefore rightly accented on the second syllable. Clemátis is now rapidly giving place to the more natural, as well as the more accurate, Clématis. Gladiólus is no worse than *Gladiolus*. The probably classical alternative, Gládjolus, does not seem to occur to the ordinary gardener's ear.—*G. S. Boulger.*

NOTES ON *SILENE INFLATA*.—Is it commonly known that this widely-distributed plant is di-, if not tri-, morphous? On Wednesday evening, the 12th June, I was forced to seek shelter beneath a tall hedge from one of those not very seasonable storms that were this year so disagreeably characterising this month. Amusing myself by examining various flowers within my reach, I was struck with the apparent fact that there were two well-marked forms of the common Catchfly. In one form the three styles (sometimes 4, sometimes 5) projected fully $\frac{1}{3}$ from the tube of corolla, no stamens being visible. A closer examination showed that the stamens were present, but that their filaments were extremely short, seldom much exceeding the average in length; and, more remarkable still, that the anthers were contabescent, *i.e.*, dry and shrivelled, containing no pollen. In the other form the stamens projected $\frac{1}{3}$, while the styles were rarely visible. On pulling to pieces these flowers, however, the styles were found more or less closely oppressed, and evidently quite immature. Further examination showed that this form was decidedly proterandrous; for, though the stamens successively arrive at maturity, commencing with those on the under side, all the anthers have shed their pollen before the styles are fully grown. At this time they are largely exerted, and have their receptive stigmas widely spreading. I have since passed many hundreds of plants in review, and find these two forms about equally distributed in this district, and wonderfully persistent in the characters mentioned. There does not appear to be any other striking points of difference between them, so far as I can at present determine. The first form is evidently to all intents and purposes always female; the second, first male and then female. I found a very few plants in which the presence of a few *dry anthers* (the rest being perfect) seemed to indicate a transition stage between the two. Fertilization must, I think, be brought about by a small dipterous fly, but *how* is not very clear. Its common name of *Catchfly* is fully justified, as any one may see who will take the trouble to examine a number of plants in the earlier part of the day. Almost every flower will then have a tenant. I applied to Dr. Morton, who informs me that Sir John Lubbock quotes Axell, to the effect that there

are three forms, one with stamens only, another with pistils only, and yet a third with both stamens and pistil. This scarcely agrees with my observations on British specimens. If it be correct with regard to continental species, it is highly interesting as showing that the modification in them has proceeded much further than in ours, and along a somewhat different line, as I can find no tendency to the production of purely male plants in ours.—*J. Hepworth, Rochester.*

VARIABILITY OF COLOUR IN HOLLYHOCKS.—In the autumn of 1873 I picked up a spike, or rather stem, of a hollyhock, with ripe seeds, which had been thrown on a heap of rubbish where it was customary to dispose of the refuse of neighbouring gardens. It was kept through the winter, and then the seeds on it were sown in a row in which the seeds from the lower part of the spike were sown at one end, those at the upper part at the other end, and the others between them in positions corresponding with those they occupied on the plant. When they had come up I took one, as from the lower part of the spike, and planted by itself, and another from the uppermost part and planted by itself, in perhaps a better situation. These two plants flowered in 1875. The one which grew from a seed produced on the upper part of the parent stem was rather stronger in growth and earlier in flowering than the other, which I attributed to its more favourable situation; for I find that hollyhocks are very much affected by circumstances. This earliest flowering plant had blossoms of a crimson red, those of the other were of a much darker colour. The plant with crimson blossoms was the one from which I took the seed which I sowed in 1876, putting in the ground the seeds from each flower separately as well as I could,—though I cannot be perfectly sure there was no error, as a few seeds fell out of their places on the ground. The plants, however, which came up in irregular places I destroyed, that I might ensure as much accuracy as possible. I had expected a difference in habit among plants raised from seeds proceeding from different parts of the inflorescence, but did not think of colour. Of two plants from seeds at the bottom of the spike, one was left on the seed-bed, where it is now alive, having made no attempt to flower. This seems to show the necessity for planting out seedling hollyhocks in order to their becoming vigorous. The other which I planted out in 1877, flowered, as did also four plants from seeds taken from a lateral spike which sprung from the same stem. The seedling plant from the spike of the main stem produced crimson flowers, like those of its parent; the plants from seeds on the lateral spike were white, with only so much of a reddish tint as to indicate their parentage. Not having much ground at my disposal, I did not take heed of the seedlings from the middle of the spike, but planted out nine grown from the seeds yielded by one of the uppermost flowers. Seeds from the uppermost flowers of all, which were hardly ripened, ger-

minated, but the plants had not vital force enough to live through the summer. The nine which I transplanted did not flower till this year, and they have not all flowered now. Three of them are like the one from the lower part of the spike one is much darker, and with many a blossom, having six petals. The plants from the lateral spike having all white flowers, that those from the main spike should present this richer colour, is what I did not expect. I suppose the variability displayed in this instance may be dependent on the fact that the parent plant from which the seeds were gathered was itself derived from a seed on the upper part of a stem. But there is one plant whose flowers are yet unopened; and from what I can make out by examining the bud, it seems as if its flowers would be white. This is so inexplicable as to make me examine my memory as to the possibility of errors, but I trust you will believe me that I cannot imagine any source of error as to the seeds being those of the same plant, and so far as I have reason to believe, four plants with crimson flowers, one with rather lighter, two with deeper, richer colour, and one whose blossoms will also spring from seeds proceeding from the same flower. I enclose flowers, the two white being of plants from seeds on the lateral spike, the others from the main spike, the most diverse from one of the upper flowers; the one from the lowest flower undistinguishable from three others.—*John Gibbs.*

HOW TO GROW FILMY FERNS.—A writer in *The Garden* gives the following interesting instructions. Any one interested in these most beautiful of ferns may grow them successfully without covering them with bell-glasses or keeping them in warm houses. In confirmation of this we may refer to a houseful of them in the Boxhill Nursery. It is of small dimensions and sunk in the ground, so that the eaves of the roof, which is of octagon shape, are only just above the surface. It is entered by means of rustic steps through a narrow span-roofed house, in which hardy British ferns are growing amongst virgin cork. The inside of the Filmy Fern-house is lined in the first place with old railway sleepers, placed in an upright position, and which support the roof. These are covered with virgin cork, on which are growing various kinds of ferns. The Filmy varieties consist of fine specimens of *Trichomanes*. *Radicans*, *Todea Superba*, *T. Pellucida*, and others are growing in pots or pans placed on a bank raised three feet or so above the ground-floor, and extending all round the house, excepting at the doorway. The side walls are built with rough stones, among which grow club-mosses and small ferns. A canvas shading under the roof is left there summer and winter, but no means are provided for heating the house artificially. Inside it is easily kept damp and close, and under such conditions Filmy Ferns grow remarkably well, both in summer and winter.

DIMORPHISM IN THE RUBIACEÆ.—MR. C. B. Clarke, in a paper on this subject read before the Linnean Society, shows that there are two kinds of dimorphism in the *Rubiaceæ*. The group is known to be largely dimorphic, the variations consisting chiefly in the lengths of the style and stamens. Mr. Clarke's two forms of dimorphism are as follows:—1. Where the point of insertion of the stamens is altered, being situate in one form high above the middle of the corolla tube, and in another form at the base of the corolla tube. 2. Where there are two kinds of fruit, one corresponding to a sessile flower, and another to a peduncled flower.

“FLOWERS, THEIR ORIGIN, SHAPES, PER-
FUMES, AND COLOURS.” By J. E. TAYLOR, F.L.S.,
&c. A second edition of this work has already
been called for, and has just been published. The
author has corrected various errors which almost un-
avoidably creep into a work of this kind, touching as
it does on such a multiplicity of subjects. An
American edition has also been prepared and sent
over. The rapidity with which this book has gone
off, whilst gratifying to the author, is a sure token of
the widespread interest taken by the public in the
leading scientific questions of the day.

BOTANICAL NOTES.—*Arum italicum*.—This plant
as many of your readers are aware, is much more
abundant than *Maculatum* in Jersey, and, I believe,
Guernsey. *Orobanche major* and *Linum perenne*.—
Can your correspondent, C. Parkinson, inform me if
the specimens of *O. major*, “parasitical on ivy,” and
Linum perenne, “in field,” noticed in Isle of Wight,
have been verified, as the undoubted occurrence of
these plants would be interesting?—*G. C. Druce.*

GEOLOGY.

THE PHYSICAL HISTORY OF THE ENGLISH LAKE-
DISTRICT.—This was the subject of a paper read by
Mr. J. Clifton Ward, F.G.S., in which the author traces
the physical history of the Lake-district from the com-
mencement of the period when the Skiddaw slate
was deposited. To this succeeded the volcanic
Borrowdale series, which is followed, after a physical
break, by the Coniston Limestone. Between this
and the succeeding Silurian deposits there is little, if
any, break. Thus, in the Lake-district, the break
between Upper and Lower Silurian is physically
below the Coniston Limestone, though palæontologi-
cally it is above it. The Old Red Sandstone period
was one of denudation, which was continued into
the Carboniferous period; and perhaps the whole
district was actually covered by the sea during the
maximum depression of the Lower Carboniferous
epoch. Since then it has probably never been sub-
merged, but exposed to continuous subaerial denu-
dation. The physical significance of the Mell Fell
(Lower Carboniferous) conglomerates received special

attention. The author then, from consideration of the amount of deposition and rate of denudation, attempts to estimate the period which has elapsed since the commencement of the record, and sets it down as 62,000,000 of years. The author then considers the age of the Skiddaw slates. From lithological resemblances he is led to correlate the Skiddaw grit with the basement grit in the Welsh Arenig series, and thus to regard the beds below the grit as the equivalent of the Tremadoc, and perhaps of part of the Lingula Flags. The palæontological evidence for the correspondence of the Arenig series with the whole of the Skiddaw slates rests chiefly on Graptolites and Trilobites. The author holds that the evidence from the former is inconclusive, and that from the latter to some extent contradictory, so that the physical evidence can in no way be overridden by it.

STROMATOPORA AND LOFTUSIA.—Principal Dawson has contributed a statement of his views as to the nature of these problematical fossils from the palæozoic rocks, which are commonly known as *Stromatopora*. They are massive fossils, often showing concentric structures when weathered, and have been referred by different writers to the corals, to the Hydroids as allied to *Hydractinia*, and to the Foraminifera. Principal Dawson says that *Stromatopora* is "a calcareous, non-spicular body, composed of continuous concentric porous laminæ, thickened with supplemental deposit, and connected by vertical pillars, most of which are solid"; and he maintains his old opinion, that "*Stromatopora* is a foraminiferal organism and the palæozoic representative of the Laurentian *Eozoon*."

NORWICH GEOLOGICAL SOCIETY.—We have received Part I. of the "Proceedings" of this old-established society, containing a list of all the papers read before the society since its foundation in 1864, and abstract of papers read during the recent session.

ANCIENT MAN.—Mr. Thomas Belt, F.G.S., the well-known naturalist, has made the interesting discovery of a human skull in the section of a railway cutting in the neighbourhood of Denver, Colorado. The skull was imbedded in perfectly undisturbed ground, at about three feet and a half from the surface. Neither the lower jaw nor any other bones were found with the skull.

FOSSIL SAURIANS FROM THE CAPE.—Mr. Thomas Bain, F.G.S., the well-known African traveller and geologist, has just sent home a splendid collection of fossil Saurians, many of which are new to science, and which have been found in the carboniferous and triassic formations of Cape Colony. They include skulls and other remains of *Dicynodon*, *Galeosaurus*, *Cynodracon*, *Oudenodon*, &c.

THE CORALLINE CRAG.—Dr. Gwyn Jeffreys, in a communication to the Linnæan Society, on some

shells dredged in the Korean straits, said that of fourteen species enumerated, six are now, for the first time, found living in the North Pacific as well as the Atlantic. *Micinella ovalis* and *Kellia pumila*, which had been supposed to be extinct, are shown to be living in the Korean region. No fewer than nine of the above fourteen species are Coralline crag fossils. Dr. Jeffreys holds that these facts support his view, that Mollusca common to the North Atlantic and North Pacific Oceans may have originated in high northern latitudes and have found their way to Japan on the one side and Europe on the other, by means of the bifurcation of the great Arctic current.

OUR WATER SUPPLIES.—Mr. De Rance has recently read a paper, "On the Palæozoic and Secondary Rocks of England as a Source of Water Supply for Towns and Districts," before the Manchester Geological Society. The paper contains much useful information on a subject growing every year more important, inasmuch as the demand for water increases, while springs and rivers do not increase. Instances are given which show how vast are the underground stores of water within the region occupied by the rocks above-named. A spring at Barrow-in-Furness yields, from a depth of two hundred and fifty feet, thirteen thousand five hundred gallons of water daily. Nearly three million gallons a day are pumped from a single well at Liverpool. Three-fourths of the seven million five hundred thousand gallons supplied daily to Birmingham is got from wells in the New Red Sandstone, and the water is described as of a uniformly excellent quality, and the Pery Well as one of the best waters for dietetic and domestic purposes ever inspected. Kidderminster has deep wells, one of which gives one hundred thousand gallons a day, and yet the present domestic supply is entirely derived from dangerously polluted shallow wells and streams.

NOTES AND QUERIES.

DOUBLE EGG.—Last year a friend brought me two hen's-eggs which were joined together in a very curious manner. The shell was continued at the apices in the form of a tube connecting the two eggs, about $\frac{1}{4}$ in. long and $\frac{1}{8}$ in. thick. It formed apparently a perfect communication, being filled with albumen. The eggs had the appearance of leaning one against the other, one being quite depressed where the other came in contact with it, which was about a quarter of an inch below the points of junction. I may mention that the shells of the eggs were very imperfect, being almost soft in some places.—*G. M. Dox, Torrington.*

FUNGUS ON FLIES.—I have seen a somewhat similar instance to that mentioned by Mr. E. Wheeler, but with this difference, that the flies so affected seemed to be confined to one particular plant. The plant was withered and dried, and the flies (several dozens) were stuck about it in all directions, and in very natural attitudes. I was not at that time botanist or dipterist enough to identify either the plant or the insects, but the latter were very similar in appearance

to the Yellow Dung-fly (*S. stercorarius*). They appeared to be all of one species.—*W. H. Warner, Standlake.*

BOOK ON DRAGON-FLIES, &c.—Can any reader of SCIENCE-GOSSIP inform me of a work on the British *Libellula* (or Dragon-flies) giving plain and satisfactory descriptions of each species? The price must be moderate. Also of a similar work on the British Ants.—*W. H. Warner.*

BEES AND PAINT.—In answer to Mr. Smith's query on this point I must confess my utter inability to assign any probable cause for his bees' apparent fondness for paint—my sole reason for replying to his question being to draw attention to another curious penchant of bees, viz., their partiality for smoke. In early spring, when engaged in gardening operations, I have often noticed the few bees out at that time hovering about the weed fires, and endeavouring to penetrate into them, even when the thick dense smoke has been issuing in volumes from the fires. This proceeding has often puzzled me exceedingly. The general warmth given out by the fires is doubtless the attraction.—*W. H. Warner, Standlake.*

CUCKOO (*Cuculus canorus*).—Towards the middle of July I caught in the garden (within two miles of the centre of Birmingham) a young cuckoo. It flew into the greenhouse, and was there caught. I suppose that the bird was enticed by the great quantity of magpie moths with which the kitchen-garden swarmed, so much so that (much as I disapprove of killing creatures uselessly) I destroyed over fifty caterpillars in twenty minutes, and have caught in a net almost as many perfect insects in the same time. As I have never seen a cuckoo similar to this one before I give below measurements and general description:—Extreme length from tip of bill to end of tail, 11½ inches; length of wing, 9½ inches; spread, 20 inches; third primary, 7½ inches; tarsus, ½ inch; and tibia, 1½ inches. The plumage was dark iron-grey, except primaries and secondaries, which were of usual colour barred with "rufus." The barrings of throat as in the adult bird, but with a great tendency to very dark brownish-grey, so as to appear at a little distance to be almost black. Tail, greyish-black, with "rufus" markings on inner webs. Iris, dark hazel-brown; cere, very light lemon-yellow. Upper mandible of bill, hair-brown; lower mandible, lighter brown at tip; suffused with light-yellow gape; and inside of mouth as usual, orange; legs and toes, light lemon-yellow, suffused with pink.—*G. T. B.*

DITTANY.—Your June issue contains a request, preferred by Henry F. Bailey, for information respecting "the name of the species of *Dittany*." It is an American plant, and is described in Professor Asa Gray's "Manual of Botany." It belongs to the Mint Family (*Labiatae*). The Common Dittany is *Cunila Mariana*. It blooms, with us, from July to September. Gray affirms that the Latin name is of "unknown origin." The Mandrake is also an American plant (*Podophyllum peltatum*). It is a member of the Barberry family (*Berberidaceae*), and is the well-known *Podophyllum* of the Pharmacopœia, so valuable a specific in complaints of the liver. We read, Genesis xxx. 14, that "Reuben went in the days of wheat harvest, and found mandrakes in the field." This, I need scarcely add, is an older quotation than any that can be culled from the works of "our early poets," referred to by Mr. Bailey.—*V. Clementi.*

VANESSA ANTIOPA.—W. R. Morse inserts a query respecting the *Vanessa Antiopa*. This is one of our

commonest Butterflies. There is no doubt that our specimens have a yellow margin to their wings. At the same time Westwood, to whose beautiful work I refer your correspondent, says that the margin of the English specimens is "of a white or whitish colour"; also that "the pale margin of the wings varies to deepish yellow." I was under the impression that this handsome butterfly had become extinct in England.—*V. Clementi.*

COLIAS.—The *Colias* mentioned by C. E. B. Hewitt is a very common butterfly in Canada, and may be frequently seen, in large numbers, fluttering over rain-puddles on our roads, or settling on their margin. This pretty butterfly is thus described by the American entomologist, T. W. Harris: "Their wings are yellow, with a black hind border, which in the females is quite broad on the fore wings, and spotted with yellow; the fringes of the wings, the antennæ, and the shanks are red; the fore wings have a small narrow black spot on both sides near the middle; the hind wings have a round orange-coloured spot in the middle of the upper side, which on the under side is replaced by a large and a small silvery spot close together, and surrounded by a rust-coloured ring."—*V. Clementi, Ontario, Canada.*

LAPWINGS (*Vanellus cristatus*).—During the snow-storm in the end of March and beginning of April, the Lapwings, who had returned to their breeding-grounds, were so pressed with hunger, that some entered the very houses in search of food. After the snow had disappeared, the remains of hundreds who had perished were to be seen. It appears they will rather die of starvation than leave their favourite haunts in the breeding season.—*W. S. Fyvie.*

INTELLIGENCE OF A MAGPIE.—Some years ago, when residing at Stowmarket, I was much struck with the intelligence of a Magpie belonging to my next-door neighbour. In a very short time, and without any effort to teach it on the part of any one, it learnt the names of several members of my family, and never misapplied them. This proves that birds, in acquiring human language, connect the object and the word, and do not use the latter at random. The Magpie in question was evil-disposed, and loved to annoy girls by pecking their feet; but on the approach of a man or a boy it scuffled away, uttering most unparliamentary phrases. Its leg having been accidentally broken, it repudiated all surgical aid. It used to sit on the sound foot and hold up the maimed limb, looking at it disconsolately, and pecking at the bandages with continual ejaculations of "D— it!" and died at last worn to a skeleton.—*J. W. Slater.*

GIGANTIC MULLEIN.—When botanizing on the 15th of August last in Spittlesea Wood, near the place I was gratified by finding an extraordinary specimen of the Great Mullein (*Verbascum thapsus*). It towered up to the height of eight feet and a half, lifting its spike of yellow blossoms above the surrounding undergrowth, which had been cut down about three years ago. The total length of the raceme was three feet six inches, and at the base of it were two small lateral flower spikes, the one about six and the other about eight inches in length. Not far from the spot other specimens were growing, the height of which was five and a half feet, but this appeared quite diminutive by the side of its gigantic fellow. This excessive growth may be accounted for by the humidity of the season and the sheltered position in which it grew. The soil is light gravel, over chalk, with flint.—*J. Saunders, Luton.*

NATURAL HISTORY NOTES FROM IRELAND.—A hen was found in a loft, the flesh eaten and picked off, leaving as perfect a skeleton as could be desired. The feathers were lying about. Rats or mice would have broken the bones. What animal could have done it?—A young black rat was killed at Portmore, Antrim, October, 1877.—The gamekeeper of Mr. Lowry, Pomeroy House, told me, within the last two years he has caught, in traps set for rabbits, two wild cats. I questioned him respecting them, in case he might have mistaken them for the domestic cat gone wild, but he stated they were perfectly distinct, having bushy tails like a fox, and dark grey in colour. He could hardly be mistaken, as he is constantly trapping the domestic cat.—The water-vole is found near Pomeroy; the squirrel is also to be found in the neighbouring woods; the water-ousel frequents the streams.—*Sam. Arthur Brenan, clerk.*

RARE BIRDS.—It is with great regret that I read of the slaughter of rare birds, recorded from time to time in SCIENCE GOSSIP and other papers. I am sure no real lover of birds, or true naturalist, would so ruthlessly destroy birds, as they are destroyed, for the sake of their skins, whenever they come to our island. Hardly a season passes but that beautiful bird the Hoopoe appears in Berkshire, and I believe it would breed, if it were not so eagerly sought after, and shot.—*J. L. H.*

THE CUCKOO AND WATER-WAGTAIL. — Last August, before 9 a.m., a young cuckoo was observed perched on a croquet-hoop on the lawn, in front of our house, full in view of spectators from the windows. A water-wagtail was busily engaged in feeding it, flying on the hoop each time it fed its strange foster-child. The cuckoo remained for half an hour on the hoop, then flew on to a small rocky near, and from thence to an adjacent railing, the wagtail following it to both places, and continuing to feed it. Both birds afterwards disappeared from sight in a large sycamore-tree. The feeding-time lasted nearly an hour, the wagtail often going some distance in search of food for the cuckoo. Our gardener told us he had noticed before the same birds thus occupied in the early morning, and had also seen a young cuckoo being fed by robins in a similar manner.—*C. M. Baynes.*

A MYSTERIOUS GIFT.—I remember reading in an old book (which also gave an account of the first ascent of the Peter Botte Mountain, near Port Louis) an account of a French creole in Mauritius, who possessed the marvellous faculty of discerning objects far out at sea long before they were visible to the ordinary human eye. His powers were repeatedly tested, and he was officially employed by the governor or merchants there to announce coming ships. He foretold the arrival of the British fleet, which came to take possession of the island, several days before it hove in sight. He stated that he saw these objects upside down (refracted?) on the horizon, and professed to teach his art; but the attempt only proved that he was possessed of some exceptional natural gift, perhaps akin to what the Scotch call "second sight." I was under the impression that the foregoing account was to be found in one of the volumes of Charles Knight's "Useful Knowledge Society's Series"; but as I have failed to discover it there, perhaps some of your older readers can help me. My present purpose is to point out a striking confirmation of the above narrative, which I have recently met with on p. 185 of Boddain-Wheltham's "Pearl of the Pacific." In narrating a visit to the Samoan Archi-

pelago, or Navigators' Islands, he alludes to "a man now living in Tutuila, I believe," he says, "but who formerly resided near Apia, who possessed the extraordinary power of seeing in the clouds, or in the sky, vessels that were bound for the island. Credible witnesses told me," he continues, "that he had frequently foretold the approach of ships days and days before their arrival, and had accurately described them, their rigging, their build, and the weather they were having—sometimes storm and sometimes calm; reference to the ships' logs on their arrival in port confirming the truth of his statements. He himself attributed his remarkable visions to the state of the atmosphere—a sort of mirage—at a certain point where he took his observations, but I never heard of anybody else witnessing similar phenomena." I thought the concurrence of these totally distinct and independent accounts worthy of your attention, as they may tend to establish the general fact of the existence of a sort of "double sight" in certain gifted individuals, and thus refer the mysterious power of the "seer" to a *physical* rather than a *spiritual* source.—*F. A. Allen.*

A SPIDER'S INSTINCT.—Dr. J. Lawrence-Hamilton writes from 34, Gloucester-terrace, Hyde-park:—"The following incident, which I witnessed, may possibly interest some of your readers:—A boy removed a small spider to place it in the centre of a big spider's web which was hung among foliage, and distant some four feet from the ground. The larger animal soon rushed from its hiding-place, under a leaf, to attack the intruder, who ran up one of the ascending lines by which the web was secured. The big insect gained rapidly upon its desired prey, the smaller creature (spiders are cannibals, notably the larger females, who are given to devour their smaller male lovers). When the little spider was barely an inch in advance of its pursuer, the small spider cut with one of its posterior legs the line behind itself, so that the stronger insect fell to the ground, thus affording time and opportunity for the diminutive spider to escape along the ascending rope of the web. This is not the only fact which seems to indicate that a spider's instinct may almost equal reason."

HOW TO EXTERMINATE MITES.—In answer to "M. R. D.," in the April number of SCIENCE-GOSSIP, as to how to exterminate small mites, I have myself found Keating's Insect Powder quite successful, after having tried other remedies in vain.—*Alfred Paterson.*

REASONING POWER OF DOGS.—I should like to call attention to what I think to be a remarkable instance of reasoning power in a dog (a setter, if I remember rightly). The yard in which this dog is kept at large is separated from a very narrow lane by a wall about five feet in height, from the top of which our four-footed friend is wont to study humanity. On an interesting occasion he loves to leap into the lane; but, when once down, he is unable to jump up again without a long run, and this is apparently rendered impossible by the narrowness of the roadway. The dog, on wishing to re-ascend, begins to trot round and round in the centre of the path, gradually increasing his pace and the diameter of the circle in which he moves, until he is galloping round at full speed, taking a good "kick off" from the stone at each revolution as soon as his orbit extends from wall to wall. When he feels that he has acquired sufficient momentum, he bounds on the top of the wall with ease. I hold that the above performance involves a process of reasoning. Instances of dogs pulling bell-ropes and turning door-handles may result from mere

imitation, but the case in point cannot be thus explained. This dog, having discovered that a rectilinear career was impossible, must have, somehow, hit upon the idea that he could run round the circumference of a circle to any desired distance, and this principle he has applied to the solution of the difficulty in a truly ingenious way.—*C. W. Carrington.*

CLAMS.—I have noticed for two seasons past "Preserved Clams" in tins, on a Liverpool Trade Circular. I think they are new candidates to gastronomic favour in this country. I take them to be the "Otter" shell (*Lutraria maxima*), found so plentifully on the coasts of Vancouver's Island and British Columbia. *Tridacna gigas* is also known as the "clam," and is, I believe, eaten, but its habits render it difficult to procure in large quantities. The "Otter" shell on the other hand is known to be one of the staple foods of the Indians of the North-West Coast, and J. K. Lord tells us that it is, in fact, a "molluscous cereal," which the squaws dig in summer from the sand and mud-banks of the coast, and dry and smoke in the interior of their dusky wigwams for winter use. I have not tasted the "preserved" clam, and cannot therefore speak of their edible qualities, but Mr. Lord's experience of "smoked" clam does not appear to have been a pleasant one, as he compares it to chewing "good old tarry rope yarn." Are any of your readers able to speak of its worth as an addition to our food stuffs?—*W. A. Cairns, Leominster.*

PRESERVING ANIMALS.—I, like "W. G.," have met with an article mentioning the method of preserving animals, practised by Mr. Waterton. This article occurs in the *Cornhill Magazine*, January, 1863. It tells what has to be done, but not how to do it. "The tools required hardly deserve the name, for all these wonderful effects are produced with a penknife, a lump of wax, half-a-dozen needles, and three or four wooden skewers. In simple fact, the *modus agendi* is pure modelling, the skin being used as the material, and reduced by art to the plastic state of sculptor's clay, a temporary stuffing being placed within it to keep the skin moderately distended during the progress of its drying." I should be very glad if some one among the many readers of SCIENCE-GOSSIP would give better the directions, or name some work where they may be found.—*W. L. Beaumont.*

ROSE-COLOURED PASTOR is not the shelah, a thrush, nor ever will be. It is a starling, and closely allied to our well-known birds. It is a visitor to all parts of the United Kingdom. There is a most interesting account of its visiting and breeding in Italy, in the "Zoologist" for last January. See also Harting's "Handbook of British Birds."—*C. R. Bree, M.D.*

THE OPERCULA OF SHELLS.—Among those who take an interest in the science of Conchology there are many who almost leave out of sight the opercula or lids by which the mouths of many shells are closed. They ought, however, to be noticed, because, according to Gray, the typical form of a shell-fish is the bivalve; and he considers the operculum but as a variation of the other valve. There seems to be some reason for this, because, as we all know, in many bivalves, as in the Oyster, the smaller valve takes very much the place of it; and in that curious shell, the Anomia, it seems hardly needed, and—one step further—in the Limpet it is altogether wanting. There is a curious provision of nature in those cases of *Univalves* in which this lid is wanting; they secrete in very dry weather, and in the winter,

what is called an epiphragm, or thin membrane, which covers the opening as a substitute for the operculum. An example of this is to be seen in the common garden snail (*Helix aspersa*). The variety of form among the opercula is very remarkable. In the case of *Cyclostoma elegans*, our only land-shell having this lid, it is nearly circular; that of *Turbo Sarmaticus* has a coralline appearance on the upper side, or, as Woodward calls it, like some of the tufaceous deposits of petrifying wells. Some again are very thin and brittle, as in the Whelk (*Buccinum undatum*), and not at all the same shape as the former, but brown and horny, and in shape an ellipse.—*S.*

CREAM-COLOURED BLACKBIRD.—A cream-coloured Blackbird was shot in Easingwold churchyard some time in March. It is a very fine specimen, and in very good condition. I may also mention that a *cream-coloured mouse* was trapped in a house in this city on the 7th. They are both in the possession of Mr. Ripley, Bird-skiffer, Feasegate, York.—*Percy Thompson, York.*

POISONOUS PROPERTIES OF THE FLUID OF THE "SOLANUM DULCAMARA."—To my certain knowledge, the berries of this plant are injurious to children. I have seen more than one instance of very serious effects having followed the eating of "dead men's cherries," as the fruit of the bitter-sweet or woody nightshade is often called,—effects which would probably have ended sadly had not prompt measures been taken. The children had fortunately in each case eaten sufficient to produce sickness, and this was aided by emetics until all the berries were dislodged. One little fellow had slight convulsions for days, therefore, I have not the slightest doubt on the subject, though Majendie and others state that they would not hesitate to take them, because they are innocuous to animals. "Seeing is believing." The twigs and leaves of the *Solanum Dulcamara* possess medicinal properties.—*H. G. Watney.*

"SORREL, from the Low German *snur*, sour."

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

R. G.—Thanks for the slide. The mounted arachnid taken from the legs of the House-fly appears to be a species of *Gamasus*, allied to the Beetle-mite (*G. Coleopratorum*, L.), but another species.

W. H. N.—Your bald-headed sparrow had, perhaps, been in the "wars," a not uncommon occurrence; or it had been affected too considerably by mites.

M. H. ROBSON (Newcastle-on-Tyne).—The box containing glass tube in which you enclosed a variety of *Hydra*, reached us with the glass smashed to pieces. It should have been posted with a luggage-label attached, on which the address and stamp should have been placed. The blow given when stamping had shattered the glass.

M. J. WILDE.—Your specimens are:—(1) a piece of Trap, with calcite crystals on joint-face; (2) fragment of Copper ore (*Cupric sulphate*); (3) piece of Milk-quartz; and (4) portion of water-worn nodule of Flint.

F. NORRIS.—The plant you sent us is a fine specimen of the Blue Fleabane (*Erigeron acris*).

ANONYMOUS.—We are obliged to call attention to an old rule of ours, which declares that anonymous communications cannot be attended to.

R. G. C.—The insect found on the dog is a well-developed specimen of the Dog-tick (*Ixodes ricinus*). We cannot undertake to answer your latter question without fuller information.

NEWQUAY.—The grass you inclose is the Annual Meadow Grass (*Poa annua*), and the other species intermingled with it is the common Spurrey (*Spergularia arvensis*, L.).

F. L. ST. A. (Hants).—The shrub labelled No. 1 is a Buckthorn (*Rhamnus Frangula*, L.), and the other specimen is very imperfect, and too small to judge correctly; but we believe it to be *Calamintha Nepeta*. Many thanks for your kind note respecting orchids.

B. M. W. (Treadow).—We detected only one rust, or cluster, at the margin of one of the leaves, which is undoubtedly *Trichobasis Geranii*, B., but we believe it is attacked by another fungus unknown to us; but it is immature, therefore difficult to decide in its present state.

G. A. H. (Manchester).—It is what we have recognised as *Chara hispida*; however, we confess they are too little studied, and very little seems to be known about this class of plants.

C. H. BOULD.—Your plant is the Soap-wort (*Saponaria officinalis*).

W. H. LEGGE.—We have forwarded your account of "a strange bird" to several first-rate ornithologists for identification, but all, without exception, state they cannot make anything out of it.

G. S. BARNES.—See an account of your peculiar malformation of cabbage-leaf in present number.

E. E. EVANS.—Your eggs were completely smashed when they reached us, so that it was impossible to name any of them.

W. E. RICHARDSON.—We have received the Trilobite, which is a fine specimen of *Calymene Blumenbachii*. What you took to be a "fin" is merely the rim of the cephalic shield. The Trilobites being Crustaceans (allied to King-crabs) did not possess "fins."

R. H. N. BROWNE.—The eggs grouped on the backs of oak-leaves are not those of *Coccus*, but of a species of *Aphis*. Two of them hatched whilst the leaf was under the microscope, so that the aphides were visible.

A. LURY (Southampton).—The white substance you sent us from the bark of a young Scotch fir is not a fungus, although it was formerly considered, and even described, as such, under the name of *Psilonia nivea*. It is of animal origin, however, like the "Apple-blight," and formed by an insect, a species of *Cynips*.

E. C.—From your specimens we can only make out the male and female of the common gnat (*Culex pipiens*); except that they are smaller specimens than usual under the microscope, they exhibit all the characters of the common gnat.

S.—It is Mr. Lankester's "Wild Flowers worth Notice" to which we referred.

F. R. S.—Prof. Hull has already published a work on the Geology of Ireland, and another and a fuller work on the same subject by Mr. G. H. Kinahan is about to be published. See papers called "Sketches in the West of Ireland," by Mr. Kinahan, in SCIENCE-GOSSIP for 1873, 1874, and 1876, giving archaeology, botany, and geology of the district.

J. CASS.—A potato tuber is only an underground bud; and the monstrosity you sent us is not an unfrequent one, as it consists of pseudo-tubers, or *buds*, forming at the base of the leaf-stalks. We have seen several examples this summer.

J. A. FLOYD.—The specimens sent us from Cambridgeshire are of Lower Cretaceous age, but, perhaps, not such excellent phosphates as the so-called "coprolite" stones, on account of their containing a large percentage of iron oxide. No. 1 are the teeth of *Sphærodus*. 2. Tooth of Saurian, probably *Campylodactylus*. 3. *Ammonoites laurus*. 4. Tooth of Saurian. The others are fragments of fossil wood, impressions of *Ammonoites*, casts of chambers of *Ammonoites*, &c.

EXCHANGES.

TO DISPOSE OF.—Eleven volumes of the Palæontological Society's publications, viz., for the years 1848 (2), 1849 (2), 1850, 1851, 1852, 1862, 1863, 1864, and 1865; also a Ten Guinea Smith & Beck microscope.—S. J. B., Rectory, Beaconsfield, Bucks.

WELL-ROOTED plants of good varieties of Ferns, blooming Greenhouse Plants (not bedding), and Cacti, in exchange for rare British and foreign Shells, polished Stones, and Fossils.—Address, F. R. E., 82, Abbey-street, Faversham, Kent.

WANTED in exchange for Lepidoptera, or a small hand Printing-press, British Birds' Eggs, side-blown.—R. Crosskey, Castlegate, Lewes.

WELL-MOUNTED Slides of Foraminifera (*Laguna*), or Diatom (*Campylodiscus cyp.*), in exchange for good Mounts, not Polariscopes.—A. Alletsee, 11, Foley-street, London, W.

WANTED, unmounted, scales of fish, palates of mollusca, spines of star-fish, parts or entire foreign beetles and butterflies, stained anatomical and vegetable preparations, zoophytes, wood sections, sori, mosses, marine algae, fungi, and micro-geological specimens. Good exchange offered.—Alpha, 16, Brunswick-street, Blackwall, London, E.

BOTANICAL exchanges desired.—Send lists to F. W. E. S., Hadlow, Tunbridge.

BIRDS' EGGS, side-blown. Having collected during late tour, can offer collectors many extreme rarities in exchange.—Sissons, Sharrow, Sheffield.

To American Entomologists.—East Indian, African, and other exotic Butterflies sent in papers in the finest condition and good species for Cocoons of *Cecropia*, *Luna*, *Io*, *Polyphemus*, and *Cynthia*.—William Watkins, 36, Strand, London, W.C.

OFFERS.—"Lond. Cat.," 7th ed., Nos. 81, 82, 97, 100, 133, 141, 145, 280, 296, 301, 316, 319, 326, 354, 369, 373, 376, 491, 531, 564, 612, 622, 627, 753, 761, 917, 984, 1147, 1160, 1241, 1317, 1447, 1448, 1502, 1577, and many others, in exchange for British Mosses or Flowering Plants. Lists exchanged.—W. E. Green, 24, Triangle, Bristol.

Cerastium holostoides, *Listera cordata*, *Juncus triglumis*, *Herniaria subciliata*, &c., for 101, 103, 153, 202, 309, 358, 494, 404, 477, 481, 526, 767, 1046, 1082, 1438, 1484, 1507, 1521, &c.—G. C. Druce, Northampton.

FOR unmounted Scales of Carp, Sole, Perch, Roach, Pike, and Haddock, send unmounted Object to J. Moore, 12, Porchester-street, Birmingham.

MICRO-FUNGI.—Wanted, unmounted Specimens of the order Æcidiae, first-class slides or material for good specimens only.—Dr. Marsh, Duke-street, St. Helens.

FOR mounted *Chelifer muscorum* send a well-mounted Slide (named diatoms particularly wanted), to George Turvill, East Worldham, Alton, Hants.

WANTED.—Set of the Human Eye: Optic nerve, cross and per. sect.; sclerotic coat, sect.; cornea, sect.; retina, sect.; chrysaline capsule; iris; ciliary process; choroid coat, long, and trans. sects.; eyelid, with hair on eyelash. Will give Geological Transparent Slides in exchange.—Address, M. Fowler, 45, Burn-row, Slamannan, N.B.

MAMMALIAN Fossils from the gravel and caves, in exchange for others.—W. G., 10, Newcastle-street, Tuxford, Newark, Notts.

ALL or part of *Design and Work*, cost 4s. 10d.; *English Mechanic*, 5s.; *Fancier's Gazette*, 6s. 9d., for back numbers of SCIENCE-GOSSIP, or offers.—E. V., 41, Peckham-grove, S.E.

SPINES of *Amphidolus cordatus* and Algae, with Diatoms *in situ*, in exchange for other objects of interest.—J. Wooller, 10, Farm-road, Hove, Brighton.

ANATOMICAL sections, mostly human; lung, heart, liver, &c. Will send some in exchange for any well-mounted objects.—C. P. White, the Priory, Lewisham.

F. atomaria, *pinaria*, *P. rota*, and others, in exchange for Moths, Plants, Mosses, or Shells.—R. Renton, Fans, Earlston, N.B.

A LARGE case, containing two well-stuffed Squirrels; also a preserved stuffed Snake (Python), to exchange. Wanted, *side-blown* British Birds' Eggs, Natural History Books, or offers. Correspondence invited, all letters answered.—W. Barrett, Roué, 165, White Ladies'-road, Bristol.

NEATLY-finished Slide of Scorpion Fly, mounted whole, offered for good Slide of picked Diatoms, or Diatoms *in situ*.—J. Neville, Wellington-road, Handsworth, Staffordshire.

To Conchologists resident at home, abroad, or in the colonies.—Having Duplicates of nearly a hundred species of the British Land and Fresh-water Shells, including many of the rarer Vertigos, such as *substriata*, *antiveertigo*, *alpestris*, *pusilla*, and *angustior*. Will be glad to exchange these for Foreign or Colonial Shells, equally good, either land, fresh-water, or marine, or would exchange foreign duplicates only for the same.—W. Sutton, Upper Claremont, Newcastle-on-Tyne.

GOOD side-blown Specimens of the following Eggs for exchange.—Cormorant, Puffin, Sandwich, Arctic and Common Terns, Dunlin, and Eider Duck, *Desiderata*: other good Eggs or Lepidoptera. Send offers.—John D. Walker, 21, Holly-avenue, Jesmond, Newcastle-upon-Tyne.

BOOKS, &c., RECEIVED.

"Science pour Tous."
 "Land and Water." July.
 "Journal of Applied Science." July.
 "The Natural History Journal."
 "Potter's American Monthly." June.
 "American Naturalist."
 "Chambers' Journal." July.
 "Ben Brierley's Journal." July.
 "Botanische Zeitung."
 "Collecting Butterflies and Moths." By Montagu Brown. London: Bazaar Office.
 Appendix to "Contributions to Natural History." By James Simson.
 &c. &c. &c.

COMMUNICATIONS RECEIVED UP TO 8TH ULT., FROM:—S. A. B.—H. T. G.—Prof. B. A. T.—H. W. S. W. B.—G. T.—H. C. C.—T. B.—E. C.—E. W.—V. C.—J. G.—T. G. B.—G. H.—R. H.—C. H.—G. T. B.—G. S. B.—W. G. P.—Dr. E. de C.—G. C. D.—E. B. S.—A. F. G.—R. H. N. E.—F. K.—C. P. O.—F. B. N.—F. R. M.—J. W. S.—F. W. E. S.—A. J. R.—J. M.—W. E. G.—W. W.—H. C. C.—R. G. C.—J. C.—R. G.—Dr. M.—M. S.—W. H. N.—A. A.—G. C.—E. R.—H. E. W.—M. J. W.—R. C.—E. R. F.—S. J. B.—Dr. M.—M. H. R.—J. S.—P. T.—J. D. W.—W. S.—J. N.—F. R.—H. L.—J. G. G.—W. L. B.—W. M. C. C. S.—W. B. R.—H. M.—F. H. A.—R. R.—C. P. W.—H. W. T.—J. W.—R. S.—J. W. S.—G. R.—E. V.—J. C.—J. A. F.—G. H. H.—W. G.—M. F.—C. C.—&c. &c.



QUARTZ, AS IT OCCURS IN THE LAKE DISTRICT: ITS STRUCTURE AND ITS HISTORY.

By J. CLIFTON WARD, F.G.S., F.R.M.S., &c.

(Read at the Annual Meeting of the Cumberland Association for the Advancement of Literature and Science.)

INTRODUCTION.



HERE are few minerals more widely spread than Quartz, a chemical compound of the two elements, Silicon and Oxygen. Common though this mineral is, however, its study opens out questions of deep interest, and may lead us from the contemplation

of a pretty piece of rock-crystal to the consideration of subtle and hidden processes in the formation of the crust of our globe.

1. *Geological Distribution.*—Quartz occurs among our lake-country mountains in several forms, but never as a rock by itself, in thick-bedded masses, as is occasionally the case in other mountain tracts.

VEIN QUARTZ exists under four conditions.

(1.) Constituting the whole thickness of a lode or vein, in which case the latter may be said to be a quartz vein, unless the quartz contains much valuable ore, such as lead or copper, for then it will more frequently be called a lead or copper vein with a quartz veinstone. Some of these quartz veins are of considerable width—many yards,—and run in straight lines, sometimes for several miles, though often broken by faults. That they contain gold in small quantities is certain, and I have in my possession some small grains of this precious metal extracted from a vein of quartz in Borrowdale. It is well known that gold has been mined in Wales for a great many centuries, but it seems not to exist in any of our Cumberland quartz veins in workable quantities, so far as I have been able to judge.

(2.) Instead of being itself a lode or vein, quartz frequently forms strings or courses running in or through a lode formed of various mineral substances.

Supposing the lode to be lead-bearing, it often becomes an important question how much of the veinstone may be quartz, and how much calc-spar, barytes, or other minerals; for the quartz is very much harder than most other constituents of veins, and if the ore has to be extracted entirely from such a matrix, the labour is much increased. Nevertheless, sometimes even quartzose vein-stuff is quite crumbling, and, when so, the working is comparatively easy. This is the case with several lead-veins occurring in the Vale of Newlands.

(3.) Quartz, when occurring either as a massive lode or a slender string, is opaque, and generally of a pure white colour; but it occurs, thirdly, in the form of clear transparent crystals, lining the sides of cracks and fissures either in massive quartz or in some other mineral substance. These crystals have the general form of a six-sided prism, terminated by a six-sided pyramid, but owing to variations in the relative size of the several faces, the appearance of the crystals may vary. Sometimes also they are coloured in various tints, due to oxides of iron, manganese, &c., mingled with the oxide of silicon, or silica, as it is more usually called. It will be noticed that the pointed ends of the crystals project away from the sides of the crack or fissure which they line.

(4.) Lastly, vein quartz occurs in indefinite lenticular masses and strings among the strata of many geological formations. Thus, occasionally it may be seen to occur between the planes of bedding of stratified rocks, more frequently, however, traversing those planes in an irregular and stringy manner, and sometimes much developed along the cleavage planes, as may be seen in the Skiddaw Slate between the summit of Hindscaith and Scope End.

QUARTZ AS A ROCK-CONSTITUENT:—

(a.) Of Stratified Rocks.

(b.) Of Unstratified Rocks and Volcanic Rocks.

(a.) *Of Stratified Rocks.*

In the Skiddaw Slates there are many parts,

especially the lower, seen on Whiteside and Grasmoor, which have been produced by sandy or gritty deposits, and the grains of quartz may frequently be distinguished clearly with the naked eye. Again, in a well-marked bed of grit, in the upper part of the Skiddaw series, to be well studied in Great Cockup, north of Skiddaw, in the sides of the southern *breast* of Skiddaw, and notably at Lank Rigg and Latterbarrow, in the south-west of the Lake District, the grains of quartz frequently approach the size of small pebbles. In all these cases the quartz fragments are more or less rounded, showing that they have been rolled in the water, and are formed of white quartz, such as occurs in veins, or such as may be won from the disintegration of granite. Even in the clay-slate proper, the microscope reveals the presence of small grains of quartz amongst the aluminous matter.

In some of the beds of Carboniferous Limestone that wrap round the mountainous tract, quartz occurs both in the form of small pebbles and of curious amorphous masses, very similar to the flint in chalk, but known as chert. In the sandstones, interstratified with the limestone, quartz, in more or less rounded grains, is the chief constituent. In the Penrith sandstone, of younger age than the Carboniferous, the small grains of quartz are specially interesting, because, in some parts of the sandstone, at any rate, each grain shows the form of a doubly-pyramidal crystal, the crystals being of very uniform size, and their form often not a great deal affected by rolling. Whence these little crystalline particles could have been derived, to form the sandstone, is somewhat of a puzzle. Among the Blue Mountains of New South Wales, Darwin observed a similar case, and remarks: "It is difficult to imagine how these crystals can have been formed; one can hardly believe that they were separately precipitated in their present crystallized state. Is it possible that rounded grains of quartz may have been acted on by a fluid corroding their surfaces and depositing on them fresh silica?" The silica in old glass sometimes regains its crystalline structure, as shown by Sir David Brewster in 1840.

Quartz as a Constituent of Unstratified and Volcanic Rocks.

(1.) *Among Granitic and Granitoid Rocks.*—Generally speaking, in true granites, quartz occurs uncrystallized, being the last of the constituent minerals to solidify; it then appears to fill up all the interstices of the other minerals, the felspar and the mica. This is the case with the Skiddaw, Eskdale, and Shap granites in the mass; though sometimes very locally, or in the form of dykes proceeding from the main mass, the disposition of the quartz is not interstitial, but crystalline. This latter mode of occurrence may be well studied in the quartz felsite of St. John, and notably in the Armbboth Dyke. In these cases the quartz and some of the felspar have crystallized out in a felsitic base, and the cross sections of the quartz

crystals often look nearly square from the unequal development of all the six sides. In the Armbboth Quartz Felsite Dyke, the embedded crystals are most clearly seen, and the pyramidal termination of both ends may be well observed.

(2.) *Among intrusive Diorites, Dolerites, &c. (Greenstones).*—I know of no cases of quartz occurring in a crystalline condition in the rocks of the Greenstone class. Nor is quartz generally a conspicuous constituent in any form among such rocks. Microscopic study of the class, however, reveals the very frequent existence of this mineral in small portions among the other constituent minerals. In some cases its presence may be due to deposition subsequent to the first formation of the rock, and such belong to our next group.

(3.) *Quartz as an Accidental Constituent.*—By an accidental constituent is meant one that forms no essential part of the rock, but has been introduced, perhaps, long after that rock was formed or solidified. Its manner of occurrence in these cases clearly shows that the quartz has been deposited from solution,--water containing silica infiltrating through the rock-mass. It thus fills up cavities, and sometimes replaces other minerals dissolved away.

Among the volcanic rocks of the district, quartz is very common in this form. In beds of lava, and sometimes in those of volcanic ash, vesicles or long almond-shaped cavities are generally produced by the escape of vapour and gases from the molten or heated matter, on its first eruption from the volcano. Subsequently, when such lava-beds have been covered up by great thicknesses of overlying strata, the water, which is for ever percolating the crust of our earth, and contains very various mineral substances dissolved in it, deposits these in the cavities and vesicles, and amongst other minerals thus left to fill the vacant spaces quartz is very common, and may often be found filling the same vesicle with the minerals calcite (carbonate of lime) and chlorite. When a large vesicle has been thus filled with quartz, variously coloured and under different physical forms, it sometimes happens that the surrounding rock is subsequently broken up and destroyed, and then the hard kernels of quartz are isolated in the form of agates. Such are the agates of Wallow Crag, Keswick.

(To be continued.)

BRAMBLES ABOUT LONDON.—II.

By Dr. E. DE CRESPIGNY, Author of "A London Flora."

IV. **VILLICAULES.**—In this section the aciculæ and setæ disappear: the stems are angular, strong, prickly, and furnished with hairs, which are usually duplicate or fascicled, and spreading; or stellately downy and adpressed; a difference

sufficiently well marked to admit of the species of this section being also subdivided.

a. Villicaulis proper; type, *R. Umbrosus* (*Macrophyllus*, var., of some authors).—The stems of this bramble when old, are frequently apparently glabrous, from the hairs being deciduous; the young shoots and flowering branches are, however, always shaggy with spreading pubescence; the leaflets round with a short acumen, moderately thick, smooth, and dull green above, pale and furnished with short hairs beneath; prickles strong, conical, patent; panicle pyramidal, with ascending branches; not unfrequent in copses and shady places: Pinner woods, Putney Heath, Broxbourne woods. *R. villicaulis*.—Stems and general habit similar to the preceding; leaflets thick, obovate, or broadly oval, often cuneiform below; obtuse or mucronate; patently dentated, green above, whitish and velvety beneath veins of the upper leaflets often reddish; panicle compact above, more open below, with ascending branches; petals white, obovate, not contiguous; sepals ovate, with a mucronate point, setose and aciculate; prickles moderately strong and straight; rachis and pedicels frequently remarkably velvety: Broxbourne and Wormley woods. *R. macrophyllus*.—The leaves in this species are large, broadly obovate, thin; panicle elongated, with ascending branches. It is a variable plant, and occurs in the woods about Broxbourne, or intermediate, with the following species:—*R. leucostachys* may be easily recognized by its close-set panicles of pink flowers, with filaments of a still pinker hue; the petals are large, obovate, and contiguous; the stems angular and hairy; leaves soft, dull green, hairy above, and more so beneath, of a roundish or obovate form; those of the upper part of the young stem and of the flowering branches whitish beneath, the rachis is whitish, with a soft tomentum, as are also the pedicels; the calyx is rather dark, hairy, setose, and aciculated.—N. B. In common with all brambles of this subsection, a few setae are sparsely scattered on the rachis, &c.

b. Tomentosi.—In this group the spreading hairs of the stem, and especially of the rachis, appear in the altered form of adpressed stellate down; type *R. discolor*. This is the bramble of general occurrence in wayside hedges; it is so well known that, except to indicate the chief points in which it differs from others, it is hardly worth while to refer to it. The stem is angular and armed with strong, usually recurved prickles; hoary when young from the stellate down; leaflets quinate below, ternate above; narrowly obovate, small (usually) coriaceous, slightly convex, dull green above, white or grey below, with a close-set felt or tomentum; rachis, pedicels, and calyx felted in the same manner; panicle narrow, with short branches; petals contiguous, obovate, pink; styles more or less deeply tinged with purple, as are also, not unfrequently, entirely or in part, the filaments. *R. thyrsoides*: less common, but by no

means rare. The stems are as stout and strongly angled as are those of *R. discolor*, but the stellate down is less closely adpressed; the leaflets are broader and more acuminate upwards, larger, and not convex; the under-side similarly felted; rachis and calyx both hairy and felted; panicle long, narrow; lower branches many, axillary; petals white. *R. rubreolus* (*Salteri*).—This bramble is the connecting link between the *Villicaulis* and the *Nitidi*. The stems in this species are nearly terete, reddish; hairs scattered and deciduous; prickles rather strong, declining, straight, not curved; leaflets obovate, or lanceolately acuminate, grey and slightly pubescent below; rachis loosely pubescent; panicle narrowly thyrsoid and prickly; petals pale rose, obovate; contiguous sepals, hairy, aciculate, obovate. It flowers early: gravelly commons,—Barnes, Putney Heath.

V. *NITIDI*.—Stems thorny, strongly angled, entirely free from hairs, aciculæ, and setæ; but the rachis of the panicle is hairy more or less: type, *R. rhannifolius* (*cordifolius*?). Arched stems of a lively red colour, angled, and furnished with strong prickles, straight and deflected, sometimes patent; leaves quinate, of a bright green colour, lighter below, ovate, the terminal one cordate, acuminate, or subcuspidate; the basal ones narrowly ovate and strongly directed backwards, finely serrated; petals white or faintly tinged with pink, obovate; styles green. Copses and on the borders of woods, not often in hedges: Hampstead Heath, Putney Heath, Harrow Weald Common. On Barnes Common and elsewhere there is a variety with smaller and more coriaceous leaves; terminal leaflet not cordate; a smaller and more compact panicle and smaller flowers of a pale blush colour. This is certainly *R. rhannifolius* proper; *R. Lindleyanus* (*nitidus*) differs from both in the form of its inflorescence, which is corymbose somewhat, with short patent branches below, and not pyramidal. It has shining bright red stems; shining light-green leaves, whitish underneath, narrower than those of *R. rhannifolius*, and coarsely and doubly toothed; petals pure white; filaments turning crimson as the flowers fade. It occurs on Harrow Weald Common and Stanmore Heath. *R. incurvatus*.—This bramble, uncommon elsewhere, is plentiful on Putney Heath and on Barnes Common; there are also a few bushes on the lower part of Hampstead Heath. The stems are green, reddish when old, smooth, angled, and furnished like its congeners with rather strong prickles, which are patent on the stems, but decurved on the rachis; the leaflets dark-green and glabrous above and below, deeply and sharply toothed, concave, the margins incurved and wavy; the panicle is narrow, branches short and patent; petals white, obovate; sepals ovate, hairy, greenish. (The peculiarity of the leaves is not seen when they are pressed and dried.)

The foregoing is by no means an exhaustive notice

of the London Rubi. Probably other species and varieties are known to observers; we have several doubtful specimens ourselves, which would, if really out of the common, warrant the inference that much may be done in this field of research. Altogether, the subject is not a very satisfactory one; but some practical gain would result from a determination of the extent to which certain deviations from the characteristics of a definite number of typical forms occur under certain conditions of locality, and whether they are constant in such conditions. The

the *nitidi*; and that which is narrowly obovate to the *tomentosi*; but we could do so only in a general sense, because the exceptions in every case would be too frequent. Specific nomenclature, therefore, derived from the form of the leaflets, should be discarded.* The down and pubescence of the stems, on the other hand, are often deciduous: true, these characteristics are frequently apparently wanting, but the lens applied to that portion of a stem which has not been exposed too directly to the sun or vicissitudes of temperature will often reveal its presence



Fig. 171. Prickles, aciculae, setae, and hairs of stem of *R. koehleri*.



Fig. 172. Setae and hairs (magnified).

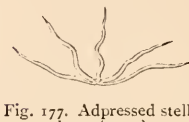


Fig. 177. Addressed stellate down (mag.).



Fig. 178. Spreading fascicled hairs.



Fig. 173. Prickles, aciculae, and setae, of *R. nemorosus*.



Fig. 174. Gland and tomentum of sepal of *R. discolor* (mag.).



181. Glandular sepals of *R. glandulosus*.



Fig. 182. Glandular sepals of *R. hystrix*.



Fig. 180. Flower-bud of *R. nemorosus*, with few-grained fruit, and sepals ascending, often reflexed.



Fig. 179. Hair (mag.).



Fig. 175. Sepals of *R. caesius*, clasping the fruit.



Fig. 176. Flower-bud of *R. fusco-ater*.



Fig. 183. Flower-bud of *R. umbrosus*.



Fig. 184. Flower-bud of *R. discolor*.

characteristic distinctions of the sections above detailed are deduced entirely from the stems; no reliance can be placed upon those derived *entirely* from the leaves, still less from the form of the panicle. This may be racemose, corymbose, pyramidal, or what not; and we may assign the corylose leaf to one section, the oval or elliptical form to the *glandulosi*; the rotund or broadly obovate shape to the *villicaulis*;* the ovate or obovate acuminate one to

in the form of withered shreds interspersed with small black specks, the points of its former attachment.

In September the blackberries are ripe, the right time for gathering specimens as well as fruit; the panicle, the new leaves, and the young or barren stems are then full grown and formed; not that flowering specimens should be dispensed with. The localities from which the fruiting ones and cuttings of the stems have been obtained should be carefully

* No definite idea seems to be attached nowadays to the term "*carpinifolius*"; formerly it was the general expression for a *villicaulis*, or hairy-stemmed bramble. Specimens so labelled in herbaria seen by us had no resemblance to the typical form of the section whatever, nor to any of the others composing it.

* The terminal leaflet is always more or less different to the others. It may be cordate acuminate while the lateral ones are ovate, and basal oval or elliptical. As for the situation of the prickles, these are on the angles of the stems when these are angled, and rarely elsewhere; their bases are often glandular or hairy as well as the stem itself.

noted and remembered, in order, when July comes round again, to obtain the flowers. Sometimes in a brake three or four species of bramble will be found growing together, their branches intertangled: care must be taken in such cases, when making cuttings, to avoid mistakes; flowering branches should always be taken with sections of the old stem attached, and in making sections of the new stem it should always be so done as to include a leaf. Notes also should be entered in a memorandum-book relative to soil and locality; habit of growth; colour of the leaves, on the upper as well as under-surface; shape and colour of the petals; colour of the styles, filaments, stems, &c.,—points which cannot be determined from dried specimens. Good localities for research are the borders of copses in open upland situations, bushy places in old chalk and gravel pits, shady unfrequented lanes, swampy woods, gravelly commons, and the bushy borders of sandy and peaty heaths.

ON A "TANGLE" DREDGE.

By H. C. C. M.

HAVING spent my holidays for several years past in shore-collecting on the North Welsh coast with considerable success, I determined this

further communications on the subject before having a dredge made. In the following number of SCIENCE-GOSSIP Mr. E. Lovett, of Croydon, recommends a dredge of hemp "tangles" as being superior in some respects to the ordinary form. Not clearly understanding how Mr. Lovett would construct his dredge, I wrote to him for further particulars, and the construction of the dredge, which I will now attempt to describe, is the result of several suggestions made in his courteous reply. My thanks are also due to David Keid, Esq., of Oldham-street, Manchester, for one or two valuable hints. A, fig. 185, is a piece of brass wire, about the thickness of a lead pencil, and 16 inches long, each end of which is firmly soldered into a boat-shaped piece of lead, BB, 4 inches in length. Lengthwise through each piece of lead a piece of brass wire, CC, about half the thickness of A, and 10 inches long, is fastened, with the ends bent round in the form of a ring. D is a V-shaped piece of brass wire of the same thickness as CC, the two arms of which are each 15 inches long, and the ends are firmly hooked to the rings of CC. To this the towing line is tied. EE are bundles of rope 4 feet long, the strands of which are untwisted, and the fibres pulled out, until they resemble bundles of coarse, rough string. These are firmly tied to the bar A. Fig. 186 shows the bar A and the boat-shaped

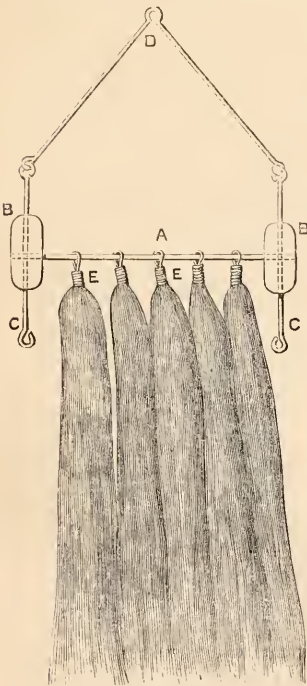


Fig. 185. A New Tangle-dredge.

year to attempt dredging in the Menai Straits. Happening to notice a query in SCIENCE-GOSSIP for March about dredging, I thought I would wait for

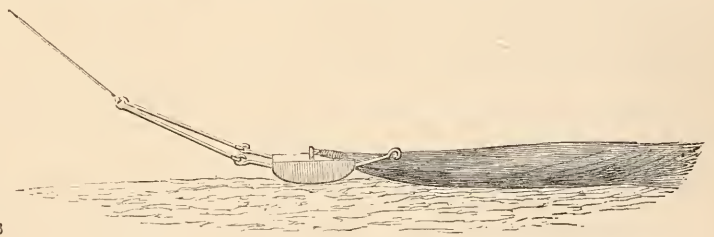


Fig. 186. Diagram showing the Tangle-dredge at work, supported by runners.

"runners" in section, and it will be seen that the bar is bent upwards, to allow of its passage over large specimens without injuring them by its weight. Fig. 187 shows the complete dredge as it appears when travelling over the ground. I found that, in order to make the machine fall to the bottom with the keels of the runners on the ground, it was necessary to have



Fig. 187. Section of Tangle-dredge as it appears when travelling over the ground.

the boat rowed against the current, and to put it into the water in the proper position, allowing it to fall to the bottom very gradually. Although I did not get a large number of specimens, my captures included sponges, sertularians, echinoderms (including some very fine specimens of *O. rosula* and *O. neglecta*),

polyzoons, mollusca, and crustacea, not one of which was injured by the tangles. A pair of scissors were, I found, very useful in removing the specimens. I am afraid that with one exception (the channel between Penmon and Puffin Island) my choice of localities for dredging was unfortunate. One place, about half a mile from Beaumaris pier, in the direction of Puffin Island, was recommended to me by several fishermen as being likely to repay the trouble of dredging, but I was much disappointed with the results of my efforts. However, I feel quite certain that the tangled dredge will prove to be a useful implement in the hands of marine zoologists, and I shall be glad if some of the readers of SCIENCE-GOSSIP will try it, and record their experience. MANCHESTER.

CANADIAN NATURAL HISTORY NOTES.

I SAW in last October number of SCIENCE-GOSSIP, an advertisement offering specimens of the notorious *Doryphora decem-lineata* for sale at one shilling each. We pay for specimens also, but we pay a few cents a pint, or so much a hundred, for them.

I also read, in a recent English newspaper, a report of the mulcting of a labouring man, the fine being likewise, if I remember aright, a shilling, for having a living specimen of that beetle of evil reputation in his possession. If such a law as that brought to bear upon the unhappy rustic were in existence here, it would superadd a large amount to our revenue, inasmuch as few of us are able to dispossess ourselves of such specimens.

It is not, however, my intention, in troubling you with this communication, to treat, at any length, on the Colorado Potato-beetle, for your September number (1877) contains an interesting article on the natural history of that garden pest from Mr. Rye, amply sufficient for your purpose at the present time. I say at the *present* time, for if the insect reaches your shores in any numbers, and if it breeds thereon, you may be glad of hints from those of us who have been overrun by this unconquerable enemy, and who have spent nights in an attempt to devise some plan for its extermination, and days in an endeavour to carry out such plan if regarded as at all feasible.

The beetle is commonly called the Potato-beetle, but it by no means follows that that all-important esculent is alone subject to its attacks. I think it will be found that, under certain circumstances, it is *omnivorous*, and that, at all events, it will not succumb to starvation even where potatoes are not grown, provided other vegetables are at hand.

For instance, where the egg-plant, *Solanum melongena*, is cultivated, my experience induces the belief that the beetle prefers this plant even to the *Solanum tuberosum*. It also attacks, although less ravenously,

tomato and pepper plants, and, somewhat singularly, the latter in preference to the former. Inasmuch, however, as these three plants are grown only on a small scale, hand-picking, the most effectual method of removing all insect-pests, can be resorted to; and therefore the beetles do not, as in the case of potatoes, at the period of hybernation, burrow in their neighbourhood, and, as a further necessary consequence, do not emerge therefrom in the spring.

Where hand-picking, from the large space to be traversed, is impracticable, Paris green is the only panacea; the powder being mixed with water in a pail and sprinkled over the plants by means of a whisk.

There is, however, a principle of *compensation* pervading nature, which has a tendency to check the ravages of noxious insects. Thus, with the advent of the Potato-beetles into Canada, there appeared, attendant upon their flight, large quantities of lady-birds, the *Coccinella novemnotata*, and others, with the object of preying on their eggs. And it should be noted, lest friends and foes be involved in simultaneous destruction, that the eggs of these two insects are very similar in appearance, being much the same in size and shape, of the same colour (deep orange), and deposited alike on the under-sides of the leaves of the plants on which the insects feed. And now we are told of another enemy of the dreaded beetle,—the *Lydella doryphora*,—to which allusion was recently made at a meeting of the Toronto Entomological Society, by its president, Mr. Brodie, in the following terms:—"It is by far the most reliable and valuable of all the enemies of *D. decem-lineata*."

When the Colorado Beetles make their unwelcome appearance in England—far distant be the day!—I would recommend the enactment of a law for the preservation of rooks; for, if I mistake not, those *Corvi* will be found most useful coadjutors to children in a potato-patch. These beetles are seen more frequently on the wing in the day-time than any other Coleoptera I am acquainted with, and present a somewhat brilliant appearance in their flight.

It may hap that the English climate will prove too damp, and the soil, in winter, too moist for their comfortable hybernation, but these conditions should not altogether be relied on: they will be upon you in time, just as the Scotch thistles have become an "institution" in the United States, and the English Cabbage Butterfly, *Pieris rapa*, has become acclimatized in Canada.

By the way, *par parenthèse*, while alluding to migrations, I noticed a communication from A. Wyles, p. 188, respecting some eggs he "obtained in the village of Roundhay, near Leeds," and which he supposes to be those of the Red-winged Starling. He describes the eggs as being of "a greenish grey, streaked with deep yellowish brown." I have none of these eggs by me at present, but Wilson informs

us that they are "of a very pale light blue, marked with faint tinges of light purple, and long straggling lines and dashes of black." The *Sturnus predatorius* is very common with us, and up our lakes hundreds of them may be seen of an evening on the rush-beds, just as I have seen the common starlings in England, where I have killed a dozen or more at a shot.

While submitting my notes on the parasites of the Colorado Beetle, it occurs to me that perhaps a few more instances of the principle of compensation may not prove uninteresting.

We have in Canada a great variety of Ichneumonflies, from the large *Pimpla lunator*, with its four-inch borer, to the *Ichneumon minutus*, each in its own peculiar way, whether by piercing the living insect, or its egg, doing its providential work in the destruction of hurtful life.

Some time ago my eye was attracted by the eccentric motions of one of the larger steel-blue Ichneumons that was flying round and round a currant-bush in my garden, ever and anon darting at an object which, on approaching it, I found to be a spider in her web. The contest, for such it was, was a long one, and put me in mind of the description of an arena-fight between a *retiarius* and a *secutor*. The latter, on this occasion, was victorious: the *rete* proved an insufficient protection, and the *fuscina*, or ovipositor, was thrust into the victim's body, with what result is well known to naturalists.

On another occasion I saw one of our larger grasshoppers, *Locusta Carolina*, struggling in apparent agony and certain helplessness on the ground. On examination I discovered a small ichneumon, not much larger than a winged ant, upon its body, intent on the insertion of its ovipositor, and although the fly was so much smaller and so much weaker than the unhappy grasshopper, the latter was unable to make use of its powerful legs or its wide expanse of wings as a means of escape.

Another singular parasite, if parasite it may be called, is the Hair Worm, *Gordius*. I once obtained two of these Abranchiata from the body of a large spider—a somewhat uncommon *habitat*. These worms were tightly rolled up into small balls of the Gordian-knot type, and were, when unfolded, only about two inches each in length.

At another time I found one of our common crickets, the *Acheta abbreviata*, with a Hair Worm curled around it. Whenever the miserable insect made an effort to release itself from the coils of its tormentor the latter lashed itself into apparent fury, and seemed to paralyze its victim until at length it accomplished its horrible design.

Are these egg-depositing operations painful to the subject? It would be interesting if observers would state their opinions, and give us the results of their observations, on this interesting subject.

Ontario.

V. CLEMENTI, B.A.

SOME REMARKS ON HORSE-TAILS.

THE Horse-Tails compose the order *Equisetaceæ*, and this order of Cryptogams is a very interesting one, both as regards the structure of the plants contained in it, and the curious hygrometric movements of their spores.

The stem is underground, and in the spring sends up branches, some of which are barren, while others bear the spores. The branches are hollow, except at the joints, which are numerous; at these points the different segments of the stem are separated by a sort of cellular membrane. Each joint likewise terminates in a sheath, which is membranous, and embraces the base of the succeeding joint. The branches are fluted, and the sheath at its upper extremity is cut into teeth, the number of which corresponds, or bears some simple proportion, to the flutings on the stem.

These plants are devoid of true leaves; but the latter are represented by branchlets, which are of a green colour, and often assume a verticillate arrangement. A very interesting microscopical object is furnished by the cuticle of the Horse-Tail—the stomata being seen with great clearness under a moderate power. The epidermis is likewise peculiar, on account of the large quantity of silex which it contains; this is so abundant in many species that they have been used by the Dutch housewives for polishing brass.

The most interesting points, however, about these plants is their fructification. All the branches are not fertile, but those that are bear at the terminal extremity a cone-like body, which, on examination, is found to consist of a great number of disks, more or less polygonal in outline, borne in a peltate manner upon a central stalk, by which they are attached to the central axis. On the under surface of these disks the spore-cases are arranged, and these discharge their contents (the spores) by a lateral slit, which looks towards the axis of the plant. The spores themselves are more or less rounded bodies, each provided with two filaments called elaters, and to the contraction and expansion of these the movements of the spores are due. The elaters end in club-shaped extremities. If the end of a branch of *Equisetum* bearing fructification be shaken gently on to a glass slide, and the latter be then breathed upon, and placed upon the stage of a microscope of low power, the spores will be seen to be undergoing the most curious movements. Some will be quite closed up, the elaters being so closely applied to the spores as to be scarcely distinguishable; others, again, will be seen gradually unfolding the filaments, and a few may be observed to move with a sudden start, as it were, from the contracted state of the elaters to that of full expansion. The ultimate cause of this movement is quite unknown. That it depends upon the

amount of moisture with which the spores are surrounded there can be no doubt. Most probably it takes place by the contraction and expansion of the cells of which the elaters are composed, under the varying influence of the moisture contained in the air. The phenomenon is a very curious one, and should by all means be seen by every one who possesses a microscope.



Fig. 188. Sporangium of *Equisetum arvense*.



Fig. 189. Transverse section of Fruit-spike of ditto (twice nat. size), showing how sporangia are attached to the axis.



Fig. 190. Fruit spike of ditto, twice nat. size.

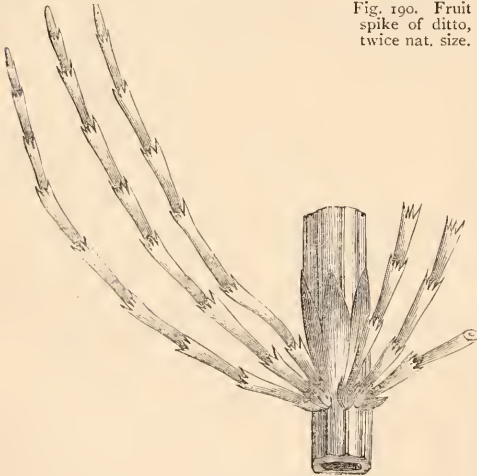


Fig. 191. Fragment of the branched stem of *Equisetum palustre*.

Doubtless the spores are endowed with this susceptibility to hygrometric changes in order to ensure their distribution, and thus the species is continued in distant places. The spore on germination gives origin to a cellular structure called a prothallus, upon which the antheridia and archegonia are borne—much as in Ferns. In former periods of the world's history the Equisetaceæ occupied a much more prominent situation in the vegetable kingdom than they do at present. If we turn to the Palæozoic strata we shall find in the Carboniferous formation of that

period abundant evidence of this. The reed-like fossil Calamites most likely belonged to this order, and the vegetation of the Carboniferous period is made up of the genera *Lepidodendron*, *Stigmaria*, *Sigillaria*, &c., belonging to the Lycopodiaceæ, Equisetaceæ, and allied orders.

This order also affords an instance of what has been called *homoplasmy*, or likeness between plants belonging to totally different orders, and even different divisions of the vegetable kingdom. Thus the Equi-



Fig. 192. Spore of *E. arvense*, showing elaters clasped round (mag.).



Fig. 193. Spore with four elaters uncoiled (mag.).



Fig. 194. Fertile stem of *Equisetum arvense*, springing from rhizome (natural size).

setaceæ of the acrogenous sub-kingdom has its counterpart in the Hippurus, or Mare's-Tail, which belongs to the division of flowering plants.

It is often the case that botanical collectors give a great deal of attention to the Ferns and Mosses, and treat with comparative neglect the humble Cryptogams, including the Equisetaceæ. This neglect seems to be unmerited; for, although the flowering plants, doubtless, at first sight, form a more attractive field for the display of the energies of the popular botanist, yet any one who will take the trouble to work at the Equisetaceæ and allied orders, with lens and microscope, will find, in the adaptation of means

to ends and delicacy of structure, quite as beautiful a series of phenomena as is presented by the structure and economy of the flowering plants. H. W. S.

NATURAL HISTORY IN THE SEVENTEENTH CENTURY.

F. KITON, HON. F.R.M.S.

IN the eighth volume of SCIENCE-GOSSIP we called the attention of our readers to the Bestiary of Philip de Thau, written in the twelfth century, during the long period that had elapsed between the publication of that treatise and the work I now propose to give some extracts from, we might expect to find a considerable advance in Zoological knowledge. Such, however, is not the fact, not the slightest attempt seems to have been made to verify the descriptions of the early writers, and their accounts of monsters are implicitly believed in.

This book is much more pretentious than the Bestiary, as the following verbatim copy of the title-page will show:—

“The
HISTORY
OF
FOVRE-FOOTED
BEASTES,

Describing the true and lively figure of every Beast with a discourse of *their severall Names, Conditions, Kindes, Vertues (both naturall and medicinall), Countries of their breed, their love and hate to man-kinde, and the wonderfull work of God in their Creation, Preservation, and Destruction.*

Necessary for all Divines and Students, because the story of every Beast is amplified with Narrations out of Scriptures, Phylosophers, Physicians, and Poets: wherein are declared divers Hieroglyphicks, Emblems, *Epigramis, and other good Histories, collected out of all the Volumes of CONRADVS, GESNER, and all other Writers to this present day.* By EDWARD TOPSELL.

LONDON:
Printed by William G. Iaggard.
1607.”

The book is a small folio, and contains about 900 pages (including the “Epistle Dedicatory” and index.) It is dedicated

“To
THE REVEREND AND RIGHT

WORSHIPFULL RICHARD NEILE, D. of DIVINITY, Dean of Westminster, Master of the Savoy, and *clearke of the King his most excellent Majesties closet all felicity, Temporall, Spirituall, and Eternall.*

The library of English Bookes and Catalogues of writers (Right Worthy and Learned DEAN, my most respected PATRON) have growne to the height not only of a iust-number, but also innumerable: and no

maruell, for God himself hath in all ages preserved learning in the next place to life, for as life is the Ministereall Governor, and moouer in this world, so is learning the Ministeriall Governor, and moouer in life. . . . As life is different, and diuers according to the spirit wherein it is seated, and by which it is norished, as with a current, as also is Learning according to the last vse and practise of rules, Canons, and authors from whan as from a fountaine it taketh both beginning and encrease euen as the spirit of a Serpent is much quicker than the spirit of an Oxe, and the learning of Aristotle and Pliny more lively and lightsome then the knowledge of other obscure Philosophers vnworthy to be named, which either through enuie or Non proficiencie durst-neuer write.”

The dedication then proceeds to dilate upon the



Fig. 195. Sphinga, or Sphinx Ape.

desirability of a knowledge of the history of animals which the writer thinks will tend to make mankind better. “Were not this a good perswasion against murder, to see all beasts so to maintaine their natures that they kill not their owne kind. Who so vnaturale and vnthankfull to his parents, but by reading how the young Storkes and Wood-peckers do in their olde age feed and nourish them, will not repent and amend his folly and bee more naturale? What man is so void of compassion that hearing of the bounty of the Bone breaker Birde to the young Eagles, will not become more liberale? Where is there such a sluggard and drone that considereth the labours, paines, and travels of the Emmet, Little bee, Field mouse, Squirell, and such others that will not learne for shame to be more industrious and set his fingers to worke! Why should any man living fall to do euill against his conscience, or at the temptation of the Deuill seeing a Lyon will never yeeld. Mori scit unci nescit—and seeing the little

Wren doth fight with an Eagle contending for soueraignty? Would it not make men to reverence a good king set over them by God? Seeing the bees seek out their king if he loose himself, and by a most sagacious smelling sence never cease untill he be found out, and then beare him upon their bodies if he be not able to fly, but if he die all forsake him. And what king is not united to clemency and dehorred from tyranny, seeing the king of the bees hath a sting but never useth the same? . . . I have followed D. Gesner as neer as I could, I do professe him my author in most of my stories, yet I have gathered vp that which he let fal, and added many pictures and stories as may appeare by conference of both together. In the names of the beasts I have not swarred from him at all. He was a Protestant Physitian (a rare thing to find any Religion in a Physitian) although Saint Luke a Physitian was a writer of the Gospell. . . .—Your Chaplaine in the Church of Saint Buttolph, Aldergate, Edward Topsell.”

In the “Epistle to THE LEARNED Readers” he gives “the Catalogue of the Authors which have wrote of Beasts,” viz., Hebrew, Greek, Latin, German, Italian, French, and the following English writers, Edward Wooton, William Turner, M.D., John Estwyck, John Falconer, M.D., Thomas Bonham, M.D. Thomas Gybson, M.D.

The Rev. E. Topsell adopts a very simple arrangement, viz., an alphabetical one, thus avoiding all the troubles of orders, families, and genera. The first animal he describes is the Antelope. “The Antelope called in Latin Calopus, and of the Grecians Analopos or Aptolos. Of this beast there is no mention made among the auncient writers except Suidas and the Epistle of Alexander to Aristotle, interpreted by Cornelius Nepolius. The vertues of this beast are vnknowne, and therefore Suidas saith an Antelope is but good in part.”

The woodcut represents the animal with slightly curved horns conspicuously serrated on the upper margins and a long tooth in the lower jaw.

The next beast described, according to the author's arrangement, is the Ape, of which he remarks that it “is held for subtell, ironical, rediculous, and unprofitable beast, whose flesh is not good for meate as a sheep, neither his backe for burthen as an asses, nor yet commodious to keep house like a dog, but of the Graecians termed *Gelotopoon*, made for laughter.

And as the body of an Ape is ridiculous by reason of an indecent likeness and imitation of man, so is his soul or spirit; for they are kept only in riche men's houses to sport withall, being for that cause easily tamed, following every action he seeth done, even to his owne harm, without discretion.”

The female, the writer tells us, “mostly lias twins, whereof they loue the one and hate the other; that which they loue they beare in their armes, the other hangs at the dam's back, and for the most part she

killeth that which she loueth by pressing it to hard; afterwards she setteth her whole delight upon the other.

The male and female abide with the young one, and if it want anything, the male, with fist and irefull aspect, punisheth the female. When the moone is in the waine they are heauy and sorrowful, but they leap and reioice at the change, for, as other beasts, so do these feare the defect of the starres and planets. They are full of desimmulations and imitation of man; they readiler folow the euile then the good they see.

They loue conies very tenderly, for in England an old ape (scarse able to goe) did defend conies from the weasell, as Sir Thomas Moore reported. They feare a shel-fish and a snaile very greatly, as appeareth by this history.

In Rome, a certaine boy put a snaile in his hat and came to an Ape, who, as he was accustomed, leaps upon his shoulder and took off his hat to kil lise in his head, but, espying the snaile, it was a wonder to see with what hast the Ape leaped from the boyes' shoulder and in a trembling manner looked backe to see if the snaile followed him.

A Lyon ruleth the beasts of the earth, and a Dolphin the beasts of the sea. When the Dolphin is in age and sicknes, she recovers by eating a sea-ape; and so the Lyon by eating an ape of the earth, and therefore, the Egyptians paint a Lyon eating an Ape to signify a sicke man curing himself. The hart of an ape, sod and dried, whereof the weight of a groat drunk in a draught of stale Hunny sod in water, called *Mellicraton*, strengtheneth the heart, emboldeneth and driveth away the pulse and pusillanimity thereof, sharpeneth ones understanding, and is soueraigne against the falling euill.”

The following is a list of Apes described by Topsell:—Vulgar ape, monkey ape, marline ape, callitriche ape, Persian ape, baboun ape, Tartarine ape, satyre ape, monster ape, Norwegian ape, pan ape, sphinx ape, Sagon ape, ape called beare ape, ape called foxe ape. Figures are given of these forms. We need scarcely say that they were in the majority of cases evolved from the artist's inner consciousness. As a specimen, we give a copy of the head of the *Sphinga* or *Sphinx* ape. Of this species the writer gives the following description:—“The *Sphinx*, or *Sphinga*, is of the kind of Apes hauing his body rough like Apes, but his breast, up to his necke, pilde (bald) and smooth without hayre: the face very round, yet sharp and picked, hauing the breasts of a woman, and their fauor or visage much like them.”

To the utter confusion of the anti-Darwinites, we quote the following from the history of a Satyre ape, clearly showing the existence of an intermediate form. Topsell's authority for this is unimpeachable, for he says:—“S. Ierom, in the life of Paul the Eremit, reporteth there appeared to S. Antony an *Hippocentaure*, such as the poets describe, and presently he

saw in a rocky valley, adjoining, a little man haung crooked nostrils, hornes growing out of his forhed, and the neather part of his body had goat's feet : the holy man, not dismayed, taking the shield of faith and the breast-plate of righteousness, like a good souldior of Christ, praised toward him, which brought him some fruites of palmes as pledges of his peace, upon which he fed in the iourney, which same *Antony* perceiving, he asked him who he was, and received this answer : I am a mortall creature, one of the inhabitants of this desert, whome the Gentiles (deceued with error) doe worship and call *Fauni*, *Satyres*, and *Incubi*. I am come in ambassage from our flock, intreating that thou wouldst pray for vs unto the common GOD who came to saue the world : the which words were no sooner ended but he ran away as fast as any foule could fly. And least this should seame false, vnder *Constantine*, at Alexandria, there was such a man to be seene aliuie, and was a publike spectacle to all the world, the carcase whereof, after his death, was kept from corruption by heat through salt, and was carried to Antiochia that the Emperor himself might see it."

"Satyres are very seldome seene, and taken with great difficulty, as is before saide, for there were two founde in the woods of Saxony, towards Dacra, in a desert, the female whereof was killed by the darts of the hunters and the biting of dogs ; but the male was taken alive, being in the vpper parts like a man, and in the neather parts like a goat, but all hairy throughout : he was brought to be tame, and learned to go vpright, and also to speak some wordes, but with a voice like a goat, and of this kind there are store in Ethiopia."

"*Of the Ass.*—Asses are of very foolish condicions and slender capacity, but yet very tame, not refusing any manner of burthen although it break his back. *Ammonianum* was in such love with an asse, and holding him of so great capacity, that he had one continually to heare his lectures in Phylosophie. *Gallen* affermeth that an ass understandeth, *genus species et individuum* ; because, if you shew him a camell that never saw one before, he is terrified and cannot endure his sight ; but if he have been accustomed to such a sight, if you shew him never so many he is not moved at them. In like sort hee knoweth men in general, being not affraid of them ; but if he see or heare his keeper he knoweth him for his keeper or maister.

The asse being overcome with melancholy humour naturally looketh for the hearbe *Citterach*, or *Fingerferne*, to cure him. The asse is neuer at peace with the cro, because he longeth for the asse's eyes ; likewise the bird *Salem*, for when the asse commeth to the thornes to rub himselfe where the same bird buildeth her nest, the asse spoyleth it, wherefore the said bird maketh continual assault vpon him. In like sort the *Colota*, or *Stellio*, for it sleepech in the mangers, and creepeth up unto the asse's nose to hinder him

from eating. The woofe is also an enemy to the asse, for he loveth his flesh, and with small force doeth he compasse the destruction of an asse ; for the blockish asse when he seeth a woofe layeth his head on his side that so he might not see, thinking that because he seeth not the woofe the woofe cannot see him ; but the woofe vpon this advantage setteth vpon the beast on the blind side and easily destroyeth the courageless asse.

Another argument of an asse's stupidity is that he careth not for his own life, but will with quietnesse starve if meal be not laid before him. Wherefore it is apparent that when a dull scholler not apt to learne is bid to sell an asse to signifie his blockishnes, is no vaine sentence ; therefore they which resemble asses in their head, round forehead, or great face, are said to be blockish ; in their fleshy face, fearful ; in broad or great eies, simple, and like to be mad ; in thick lips and the vpper hanging over the nether, fooles ; and in their voyce contumelious and disdainfull. . . . The *Iewish* people, who like asses, could not understand the evident truth of Christ in the plaine text of Scripture, wherefore our Saviour secretly vpbraided their dulnes when he rode upon an asse.

Touching such medicinall vertues as have been tried and found to be in the several parts of asses in learned and approved writers, now in this history they shall be briefly remembred, and so this narration finished."

These remedies would occupy more space than the editor would grant me, an example must therefore suffice. "If any be hurt by the starres wash them in asses stale mingled with *Spiknard*, the same force has it against cornes and all hardness or thiknesse of skinne."

"*Of the Indian Asses.*—It is questionable whether the *Monoceros*, commonly called a *Vnicorne*, the *Rhinoceros*, the *Oryx*, and the *Indian* asse be one beast, or diuers ; for the *Vnicorne* and *Rhinoceros* haue the same things attribvted to them in stories, and differ in verie few reports, both Aristotle, Pliny, and *Æhanus* coyntly agree that they differ from all other whole-footed beasts, because they haue one horne in the forehead, and so haue also the *Rhinoceros*, *Monoceros*, and *Orix*, but the Indians cal a *Vnicorne Cartagono* ; and the horne so highly prized at this day is thought to be of the *Rhinoceros*, but *Æhanus* and *Philes* acknowledge no other *Vnicorne*, but the *Indian* Asse, who in bignes equalleth a horse among the Indians, being all white on the body, but purple-headed or red (as some say), black eyes, but *Volatteranus* saith blew, hauing one horne in the forehead, a cubit-and-a-halfe long, whose upper part is red or bay, the middle black, and the neather part white, wherein the kings and mighty men of India vse to drink, adorning it for that purpose with sundry bracelets, precious stones, and works of gold holding for truth that all those which drinken in those hornes

shall be freed from annoyance of incurable diseases, as convulsions, the falling euile and deadly poisons."

We find two other species of asses described in this voracious history, viz., the Alborach and Axis; the former is, the author says, "the animal whereupon the Turkish priestes and blasphemous idolaters perswade the silly pilgrims of Mecha that Mahomet was carried up to heaven."

Of the Badger, otherwise called a Brocke, a Gray, or a Banson.—The Rev. E. Topsell most unkindly exposes the ignorance of this animal; he commences his description by saying, "The Badger could neuer find a Greeke name. The Italians call a Badger *Tasso*; the Rhetians, *Tasch*; the French, *Tausson*, *Tuixen*, *Tusson*, *Tesson*, and sometimes *Grisart* (for her colour), sometimes *Blareau* (now *Blaireau*), and at Parris *Belouo*; the Spaniards, *Tasugo*, *Texon*; the Germans, *Tachs*, or *Daxs*; the Illyrians, *Geswecz*. Badgers are plentiful in Naples, Sicilly, Lucano, and in the Alpine and Heluitian coasts; so are they also in England. In Italy and Germany they eate grayes flesh, and boil it with peares, which maketh the flesh tast like the flesh of a Porcupine. The flesh is best in September, if it be fat."

(To be continued.)

AN EDITOR'S HOLIDAY IN THE WEST OF IRELAND.

ONE of the most bewilderingly lovely drives or walks in the West of Ireland is that from Westport to Cliefden. The distance is something over forty miles, and the road is tolerably good, although in many places chequered by acclivities and declivities. If walking, we should recommend the pedestrian to do the first eighteen miles to Leenane, which is, in our opinion, the most beautiful spot we visited. The road thereto lies over the mountains, and, after gradually ascending three or four miles from Westport, we traverse the surface of a table-land, everywhere boggy and wet, and with pretty loughs or lakes studding its surface. Some of these loughs are very paradises of water-plants, and their margins are covered with the cool green leaves and exquisite white blossoms of the common water-lily. All round this table-land there rises a panorama of hills. Some of them may be called mountains, for they are three thousand feet in height, and their tops stretch upwards into the sky, so that the cloud scenery is mapped and patterned by their presence, and presents quite a different appearance to cloud-land in our own parts of the country. They have a riven and a weird look, these ancient hills, for they are composed of the very hardest rocks known to geologists—namely, the metamorphic rocks. The Silurian sandstones and slates and limestones, most of which once contained fossil remains, have been so

completely altered by heat that scarcely a trace now remains of a fossil, and yet their geological map—for this country has been geologically surveyed by some of our ablest men—shows the whole region in a variously coloured pattern which indicates how different is the variety of rocks. The white lines on the map, which represent *faults* or vertical crackings and slippings of the solid rock, are exceedingly numerous. Along the line of some of these faults the valleys now extend, for they have proved the weak places where weathering action could be best exerted. The outlines of these grand old hills have been sculptured by Father Time. They are amongst the oldest of our British mountains, and no country in the world has such ancient mountains as Great Britain and Ireland! For millions of years the storms of different climates have gathered around these ancient peaks, and have spent their fury upon them not in vain, for it is chiefly by the combined and continued action of the weather that their very shapes are now due.



Fig. 196. Terraced Limestone Hills, Glen Colombkill.

From the table-land we have mentioned, a peaty stream called the Erive makes its appearance, at first so small that a boy could jump across it easily. As we pass along the uneven road, the stream gathers strength from its numerous tributaries, all of them after a rainy night seaming the sides of hills like silver threads; and anon it gains in violence and volume and brawls over its rocky bed, which latter widens as well as deepens as the stream descends towards the sea. Here and there it throws its volume of seething water over some rocky terrace as a waterfall or cataract, and occasionally its restlessness seems to be checked by some deep pool which the brown, peaty-coloured water causes to appear of unfathomable depth. Everywhere, however, along the route of the stream, even in these elevated regions, there was growing such a wild luxuriance of that most magnificent of all British and even exotic ferns—the Royal Flowering fern (*Osmunda regalis*)—as we have never before seen, except perhaps once along the

southern side of Barton Broad, in Norfolk. The tall fronds rise to a height of five and six feet, with their brown spore-bearing branches rustling to and fro in the mountain wind. As we passed along the road we saw numbers of ordinary marsh plants, but we were on the outlook for one particular flower which occurs nowhere else in the British Islands, except these western coasts of Ireland. It is one of the heaths, known as St. Dabeoc's (named after an Irish saint), and formerly christened by botanists *Dabeocia polifolia*, although now, in honour of a Scotchman, its generic name has been unmusically changed to that of *Menziesia*. By and by we came in view of this lovely heath. Great was our joy, for we had never seen it before except in the pages of Sowerby. The reader may well pardon the delight of an ardent botanist at the first sight of this plant, growing in luxuriance in its wild abodes, for its beauty is not exceeded even by the magnificent heaths which have been imported into our green-

the primitive village and capital inn of Leenane is situated. No better spot for the tourist to rest a few days could be selected than this. Along one mountain pass he can proceed to Kylemore Lough, which is, perhaps, the loveliest in Ireland, with the exception of one of the lakes of Killarney, for Kylemore Lough has not only rugged and bare mountains rising around it on every hand, but these are softened down near the margin of the lake by rounded bosses, festooned with honeysuckle, and bramble, and wild rose, the haunt of a thousand plants dear to the botanist, and now bright with three or four species of heath, including an abundance of our prized *Dabeocia*. Shrubberies of hazel bush, willows, alder, and larch come down to the very edge of the water, while above them stand stately groups of Scotch fir, whose rough stems gather all the light that is in the sky and reflect it in the very warmest of colours. Rarely have we been more pleased with a situation than that of Kylemore. At one end stands the magnificent



Fig. 197. Distant View of the Terraced Hills of the Burren, as seen from North of Galway Bay.

houses from the Cape of Good Hope and Australia. Its rose-coloured, bell-like flowers are about three times the size of those of our English heaths, which latter grow side by side with it, as if for the sake of comparison.

After some miles of tramping, the pedestrian will discover that he has passed the highest point of the water-shed, for the streams are now flowing in a different direction. The mountain scenery becomes grander as he proceeds, the mountains appearing to present themselves one after another like the billows of a stormy sea. At length a glimmer of light appears between the hills where the valley ought to be, and we gradually approach Killery Bay. This is a fiord like Clew Bay, extending from the sea sinuously into this mountain land for a distance of twelve or fifteen miles, the mountains rising in some places quite steeply from the water. Various mountain streams pour themselves into it at the head where

seat of Mr. Mitchell-Henry, M.P. for Galway, who has done good work in the neighbourhood by inducing the peasantry on his estate to drain the bog lands, so that they are being rapidly converted into fertile fields.

From Leenane there are beautiful roads to Delphi, through Glen Fee, and to the Pass of Saal Ruck, a walk of about six or seven miles after having crossed Killery Bay. The bay is full of fish, especially mackerel and whiting, and this delicate food can be obtained in almost unlimited quantity. From Leenane to Cliefden is about twenty-four miles, and Kylemore Lough may be taken on the road. Towards Letterfrack we were particularly struck by the signs the landscape presents of the influence which moving ice has exerted in this region. During all our journeyings we had been beset by the strongest evidence of this kind, but nowhere is it more plainly seen than at Letterfrack. Huge hillocks of refuse

are composed of fragments of rocks of almost every size of bigness and smallness, each fragment polished and scratched by the ancient ice-sheet which long ago disappeared. Low rounded bosses of rock, called *roches moutonnées*, had been seen on each side of the road all the way from Westport, many of the latter covered with scorings and *striae*, all of them converging in the direction of the valleys. There can be little question that, before these bays or fiords were filled with salt water, they had been filled with ice, and had very probably been deepened by the mechanical erosion of the moving ice-sheets towards those deeper and lower parts now covered by the waters of the Atlantic.

Near Letterfrack we came upon some limestones which had been altered by heat until they assumed the appearance of loaf-sugar. Some of the limestones have been coloured green, and the well-known "green marbles" of Connemara are obtained from this deposit. Of them many exquisite ornaments are manufactured and sold at Clifden, the deposit cropping out along the hillsides. A grander country for the geologist, and especially for the physical geologist, could hardly be selected than this, for there are so many varieties of rock formations, particularly of the older and more primitive rocks, that at every few hundred yards the student comes upon a new stratum on which he feels forced to exercise his hammering abilities. Perhaps none of them struck us more than the outcrop of what had once been a Lower Silurian conglomerate, that is to say, a shingle or gravel bed, which had accumulated as such in one of the earliest geological periods. The pebbles of this bed were formed of various kinds of granite, and they had been cemented together in a sandy and clayey kind of matrix, until the entire stratum had become solid. Then this bed had been exposed to the influence of heat and the enormous pressure of overlying masses, so that both the pebbles and the material in which they had been imbedded had been metamorphosed together. No more instructive illustration of the great changes effected upon the configuration of the earth's surface by the agency of heat could have been afforded. The only drawback to the geologist whilst studying these rocks is the absence of a donkey-cart and a good strong donkey, for his knapsack soon gets full and his pockets weighed down, and, worst of all, he is obliged to leave specimens behind him that he would otherwise gladly carry away to gloat over and study during the winter months.

We reached Clifden late in the evening, when the dusk was falling around us, and the neighbouring hills were gradually shading off into immaterial obscurity. We rose early next morning in order to catch the eight o'clock mail-car for Galway. Punctually to the moment, a lumbering old car, with two Irish horses harnessed thereto, made its appearance at the hotel door, an Irishman perched as if he were on the top of a chimney-pot in front of the

machine. The first part of our way led us by the side of the well-known and much-talked-of Twelve Pins or Bens, both the word "Pin" and "Ben" (which is common in Scotland) meaning head or peak in the Celtic language. The names, in this instance, have reference to a group of twelve tall mountains which stand clustered together in the wildest part of Connemara. The road to Galway winds in and out of the valleys formed by and along the base of the mountains, so that we had magnificent mountain scenery on the left-hand side, whilst, on the right, there extend, for miles, a series of lakes like "pearls on a string." Some of these lakes, as, for instance, Lough Inagh and Glenda Lough, are of considerable size, and have islands in their midst upon which are the ruins of many an old castle or keep. At Ballynahinch, in one of the largest of these islands, we behold one of the finest of these castles, that of the Martins, an Irish family which once possessed almost regal power in this part of the country, and owned no fewer than 200,000 acres of land. At Recess there is a capital hotel, much frequented by salmon and trout fishers, their prey being abundant in the lakes and rivers of the neighbourhood. Here, too, the scenery becomes more wooded; but the drive from Recess to a village called Oughterard is one of the wildest and most dismal that it is possible to imagine. We saw it under characteristic conditions. There was a drizzling rain descending from the mountain clouds all the way, and it seemed to bring out the misery and the sloppiness and the bogginess of the low grounds in all their intensity.

As we approach Galway the country becomes more cultivated. The roadsides and walls are perfect paradises of ferns, among which *Scolopendrium vulgare*, *Asplenium trichomanes*, and *Ceterach officinarum*, are most abundant. There are signs of greater wealth, and here and there mansions make their appearance with rich woods around them. Lake Corrib stretches away to the very heart of the Twelve Pins, some forty miles away, and a steamer plies up and down the water during the summer months. At Galway bridge we could see from the parapets the salmon in scores, three or four thick, lying at the bottom of the stream, waiting for the freshets, so that they could pass up the salmon leap and through the loughs into the mountain streams above. A day or two may be agreeably spent in Galway, especially in exploring that outlying suburb called the "Claddagh," where the Spanish settlers of 300 years ago still live apart from their Irish brethren, with a mayor of their own, elected every seven years, and governed by their own unwritten laws (which are obeyed much more strictly than the written laws of the Saxon in Galway town).

We left Galway by the steamer which crosses the bay to Ballyvaughan. The day was intensely hot, and the atmosphere seemed full of light. Hence the white limestone-terraced hills of the Burren would

have been unbearable for one's eye to gaze upon had it not been for the oases of greenery here and there. We think there can be little doubt that these rock-terraces are due to weathering, and that they do not represent successive sea-beaches, as some imagine. The terraces appear to coincide with the outcrop of the limestone beds, and the terraces are most pronounced towards the tops of the hills, the *débris* lying along the bases having greatly protected the lower strata from meteorological erosion. The rainfall hereabout is 54 inches in a year, and as it mostly descends in a fine drizzle, nearly every drop must tell upon the limestone, and its weathering action must therefore be almost complete.

We stayed a few days at Lisdoonvarna, a pleasant green country, richly undulated, where the Yoredale shales abut against the Carboniferous limestones, and the water percolating through the former dissolves away its iron pyrites, so as thus to form "Spas" of notable benefit. Dr. Westropp, the kind and genial physician of the place, has made a remarkable living collection of all the varieties of the Hart's-tongue ferns found growing in the fissures and joints of the Carboniferous limestone near Blackhead. These joints are very numerous, and in each of them we saw growing a wonderful luxuriance of Maiden-hair (*A. capillus-veneris*) and other ferns; while on the cliffs the surface was matted with *Dryas octopetala* (still in flower); and patches of *Stictis spathulata* grew here and there, close by denser tufts of *Asplenium marinum*. Near Mohr Cliffs we found *Lastrea recurva* completely covering a bank for a short distance. These Cliffs are a magnificent spectacle, rising quite perpendicularly for nearly 600 feet out of the sea. They are formed of Lower Carboniferous rocks, the thin flagstones of which are completely covered with worm or molluscan tracks. We should be delighted to convey to our readers even a faint idea of the pleasure we enjoyed from the detailed exploration of the limestone rock-gardens, surely unknown the whole world elsewhere, and of the loveliness of the green western Irish land, and of its balmy atmosphere, which one can almost taste!

The Carboniferous limestone underlies the whole country hereabout—a land bare, almost as a wooden table, of grass, and yet richly feeding numbers of sheep. The real reason why sheep are able to feed over the limestone tract of the Burren hills, is that the rocks are so much fissured with the vertical cracks, in which grow the loveliest of wild plants, many of them rare to the botanist, and a profusion of such ferns as the Hart's-tongue, the Maiden-hair (*Adiantum capillus-veneris*), the Ceterach, and many others. Various species of grass also grow in these chinks, and it is upon the latter that the sheep browse, and so the spectator is presented with the peculiar appearance of sheep grazing on what appears to be a region of the poorest and the baldest rock.

MICROSCOPY.

"NEW FORMS OF ANIMAL LIFE!!" (*vile Times* report of Sir W. C. Thompson's paper on the official report of the *Challenger* Expedition, August 21, 1878).—"Sir W. Thompson says that Mr. Holdich is illustrating most of the pelagic genera, these plates representing several remarkable forms of 'shizopods,' to which they have given the name of *Challengerida*, as they seem to have hitherto escaped observation. Professor Hatchel is about to publish a splendid memoir of the *Radiolari*. Any one acquainted with Hatchel's classical work, 'Die Radiolariem,' would have some idea of what may be expected of that memoir. Mr. Moseby is at work on a most remarkable little series of coralloid forms of the Hydrogor, which he has named *Hydrocorotmal*, and on their strictures and relations Mr. Moseby's careful work, during the voyage and since their return [query, of the *Hydrocorotmal*?], had thrown quite an unexpected light. Professor Hatchel would describe the *medusa*. The *Peliatozo* would be described by himself (Sir W. Thompson). About twenty plates were cut stone (these will make a heavy book) illustrating the stalked crinoids. Professor Alexandrac Ligussis was going on rapidly, with the *Echiniden*. Mr. Lyman was working at the *Opherxides*, and he expected Mr. Phere, of Upsala, to come over to examine the *Holtheridea*, which he was going to describe under the general superintendence of Professor Lowe." A friend says I am mistaken, these are not new names, and if the following corrections are made it will be all right. For *shizopod* read *rhizopod*, *Radiolariem* read *Radiolarien*, for *Hydrogor* read *Hydrozoa* (I still adhere to it that *Hydrocorotmal* is new), *Opherxides* is the same as *Ophiuride*, and *Holtheridea* is identical with *Holothuride*, and Professor Hatchel is vulgarly known as Haeckel.—F. K.

HIGHBURY MICROSCOPICAL SOCIETY.—We are pleased to state that a Highbury Microscopical Society has just been formed under the presidency of Dr. Alabone. Applications for membership should be addressed to the hon. secretary, Mr. R. B. Brindley, 37, Highbury Park, N. The opening meeting of the society will take place on Thursday, October 10th, at Harecourt Hall, St. Paul's Road, Highbury, with an exhibition of objects of a scientific nature, principally shown by the microscope. Tickets free on application.

MEASURING WITH THE MICROSCOPE.—A very simple arrangement for measuring microscopic objects has been invented by Mr. G. J. Burch, and fully described in the "Transactions of the Quekett Club," for July, 1878. It is as follows:—The body of the microscope is placed in a vertical position, and one of the forms of "Beales's" Neutral Tint Camera Lucida, placed as usual over the eyepiece, attached to the tube of the Camera, and at right

angles to it is a light rod, of any convenient length, upon which a graduated scale slides opposite to the thin glass in the Camera. On looking through the latter the object will appear to have the scale laid upon it, and its size can be easily determined. The rod upon which the scale is clamped should be graduated in order that the magnifying power of the objective may be ascertained and registered: this is ascertained in the following manner:—the divisions on the scale are adjusted to those seen on the stage micrometer, and its position noted for future reference. It is necessary the figures on the scale should be reversed. A goniometer scale for the measurement of angles can be easily substituted for the ordinary scale.

THE MINIATURE MICROSCOPE LAMP.—We have recently tried the above-mentioned lamp, just introduced by Messrs. How & Co., St. Bride-street, Ludgate Circus, London, and find that, although very much smaller than those hitherto in use, it affords a pure white light sufficient for all microscopic purposes. One of the advantages of its small size is the much less heat given off, a somewhat important matter, when a dozen or more lamps are burning simultaneously. It is fitted with the Improved "Hailes" shade; this in its original form, as most of our readers are aware, was that of a porcelain cylinder, with an aperture at the lower part, the rest of the light being obscured; it was supported by a brass ring sliding on the upright rod of the lamp. One fault in this form of shade was that a great amount of light was visible above it, and generally on a level with the eye of the observer. In the new shade this

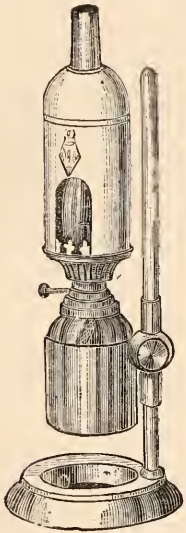


Fig. 198. The Miniature Microscope Lamp.

has been obviated by the upper part being made dome-shaped, the eyes being thus effectually protected from glare. The shade is supported by a "gallery" just below the burner; it is therefore always in position. The lamp, when not in use, is packed in a japanned tin case, about 3 inches in diameter, and 9 inches in height, and weighs under two pounds.

THE PAINTED LADY.—Have you ever observed a kind of metallic sound when this insect is on the wing? I also fancy it has a partiality for sandy patches on hedge-banks, especially under the shade of trees. It flies later in the evening than some other species, and is a bold insect—returning to the spot where an attempt has been made to capture it. —H. M. C. C. S.

ZOOLOGY.

THE BLACK-THROATED STONECHAT IN LANCA-SHIRE (*Saxicola stapazina*).—It is a pleasing duty to me to record the taking of a very beautiful specimen of what I consider an exceedingly rare bird in our neighbourhood (*Saxicola stapazina*). The specimen was shot by a friend of mine about the middle of May this year on the margin of the Bury and Radcliffe Reservoir; and, though very mangled with shot, having a goodly number of 6's, it has been very well mounted indeed by my friend Johnson, of Prestwich. Considering the condition it was in from being killed with such large shot, I really doubted at one time whether it could be mounted; however, it has been, and a valuable addition to our list of birds it is. We naturally ask ourselves now, if this bird is no native what is it doing here, and how came it to visit us? The most probable solution to this is, the Stonechat family are migratory, leaving us for more southern and western countries about the beginning or middle of September, returning to us in large flocks about the end of April or beginning of May; and likely enough this specimen, being of the same habits as our Wheatear, has travelled along with a flock and reached our shores, whence he would drive inland in search of a mate. I have sought many works on British birds, but failed to find its mention; and the only description I can find is in Cassell's "Book of Birds," vol. ii., p. 199. The bird I have is a male bird, in fine mature plumage, and in very good condition when shot. Its habits when alive, as noticed by several parties for a few days prior to its being captured, were very active, vigilant, and shy. It seemed to hold itself aloof from any of the same order (*Saxicola oenanthe*). Cassell's description of these birds in their native home is very interesting, and I here give an extract:—"Though they by no means avoid fruitful tracts or cultivated districts, these birds very decidedly prefer to take up their abode in mountainous or stony regions; and are for this reason particularly numerous in Sweden, Southern Germany, and Switzerland; in the latter country they are popularly known as Mountain Nightingales, from the height to which they often ascend. Even the icy and rugged tracts of Scandinavia and Lapland seem to suit their requirements, and we have often seen them hopping nimbly over the glaciers in situations where no other living objects were discernible. Individuals inhabiting more southern latitudes display the same liking for barren grounds, and are usually seen in localities so sterile and arid as to appear totally incapable of affording them a sufficient supply of the insects upon which they subsist; their disposition is lively, restless, and very unsocial; only during their winter migrations do they seem to commingle with others of their species, even when circumstances compel a certain amount of neighbourship; each bird lives for itself, without appearing to have

the slightest interest in the proceedings of others in the vicinity." In order to more clearly identify this specimen from our Wheatear (*Saxicola ænanthe*), I have had a male specimen of the latter mounted along with it, from which it will be seen there is a very wide difference; the colours of *S. staphazina* are, on the head, nape, and back, white, slightly tinged with rust yellow; on the belly and breast dulled white; the throat and cheeks, from above the eyelids, including the ear-coverts, are jet black, quite as much or more than the Pied Wagtail (*Motacilla Yarellii*); the upper and under tail-coverts are white; the two outer tail feathers on each side are white, slightly edged and tipped with black; while the three next on each side are white, slightly edged (but not tipped) with black, the middle tail feathers are entirely black, the wings are a beautiful glossy black, as are also the legs and toes. I did not take the dimensions of the bird when dead, but it is a trifle smaller than *S. ænanthe*, as will be seen on comparison. I have shown the specimen to several very able naturalists, and not one remembers having seen the species before.—*R. Davenport, Bury, Lanc.*

ANIMAL STUPIDITY.—In studying the intellects of the lower animals it is no less important to note their mental shortcomings than the cases in which they reason correctly. Early this year I observed a singular piece of irrationality on the part of a large black retriever. The animal lived in the last house of a "terrace," in one of the northern suburbs of London, separated from the next terrace by a walled alley. Finding itself one day locked out, and being unable to effect an entrance either by the front door or by a side door leading into the alley, it made its way into the front garden of the end house of the next terrace, and made most persevering but fruitless attempts to leap over the wall. Had it succeeded it would, of course, only have landed in the alley which it could enter from the street. After a short time it left the garden, and ran round into the street and the alley, but still returned again and again to its endeavours to jump the wall until its master came home.—*J. W. Slater.*

CANNIBALISM AMONG CATERPILLARS.—Receiving two half-grown larvæ of the Goat Moth, I put them into a tin box and left them for a short time. On reopening the box I found that one caterpillar had entirely devoured the other except the hard case of the head and a portion of the skin and prolegs. At first sight I thought that the larvæ had assumed the chrysalis state, or had thrown off its skin, but a careful examination failed to discover the chrysalis, and the box was too securely fastened to allow of the caterpillar's escape; so the conclusion that one larva had devoured the other was the only one I could satisfactorily come at.—*C. C.*

PARASITE OF THE LINNET.—I am induced to write the few following remarks to SCIENCE-GOSSIP

under the belief that this parasite is not well known. I shall be glad to hear if any subscriber has a similar specimen. Figure 199 shows this parasite magnified 50 diameters, and figure 200 shows one foot magnified 280 diameters. It is evidently a *Physostomum* and not unlike *Physostomum mystax*, said by Mr. Denny



Fig. 199. Parasite of Linnet $\times 50$.

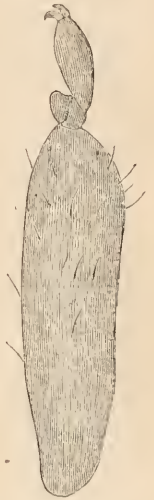


Fig. 200. Foot of Parasite of Linnet $\times 280$.

to infest the chaffinch. The head is large and devoid of antennæ and trabeculæ. The legs are long, the femora thick, the first joint of the tarsus has a pulvillus. The mesothorax is wanting and the metathorax is continuous with the abdomen, which consists of 9 segments. The colour of this parasite is brownish yellow with a dark band down each side. It can move with great rapidity among the feathers of its host.—*W. A. Hyslop.*

THE COLORADO POTATO-BEETLE.—The appearance of the Colorado Beetle at Jaratschervo, in the district of Schrimm, in the Prussian province of Posen, has been officially reported.

THE HABITS OF THE FIELD VOLE.—At the British Association Meeting, Sir Walter Elliott made a few observations on the annual increase of the common vole (*Arvicola agrestis*) of late years. In the spring of 1876 they appeared in such numbers in the hill pasture farms of the Border districts between England and Scotland, and parts of Yorkshire and Wensleydale, as to destroy the grazing ground on which the sheep depended in spring, causing serious loss to the farmers by impoverishment and death of stock. The shepherds destroyed as many as they could without sensibly diminishing their numbers, although assisted by birds and beasts of prey—hawks, buzzards, owls, weasels, foxes, &c. At the same time that the vole was doing such mischief, another species (*Arvicola arvalis*), not known in

England, made its appearance in Hungary, and attacked the corn-fields, which it had done to a less degree in two or three previous years, and this year they had attacked the wheat-fields of Moldavia, as appears by a late paragraph in the *Times* newspaper. Many instances are recorded of great damage being done by them, both in England and Scotland, by destroying plantations, of which Mr. Jesse described a notable instance in New Forest and Dean Forest some time ago. These examples prove that they do not confine their attacks to pastures and woods, and it is possible that they might, under favourable circumstances, betake themselves to our corn-fields. It is therefore worth consideration whether our game-preservers should not be more forbearing towards the hawks, owls, and weasels, which are nearly exterminated in many places, although they live almost entirely on these and other small creatures. Sir Walter inquired whether anything similar had been seen in Ireland; also whether, as moles and hedgehogs were the natural enemies of the vole, they should not be spared; and with reference to a statement in "Bell's History of British Quadrupeds" (last edition) that the hedgehog was not found in Ireland, whether this was really the case? Several speakers said that the hedgehog was very plentiful in all parts of Ireland.

DR. SCLATER ON SPECIFIC NAMES.—In answer to Robin Goodfellow, in SCIENCE-GOSSIP, p. 189, I would observe, that it is a great error to suppose that specific names must necessarily be adjectives. In many cases they are substantives, and may then be of a different gender from the generic name, e.g. *Turdus merula*, and *Cervus dama*. This is the case with the now scientific name of the common robin, which has puzzled R. G.'s little boy, and which is correctly written *Erithacus rubecula*, *rubecula* being a substantive like *Erithacus*, and standing in apposition with it. In the same way Linnæus called the Kestrel *Falco Tinnunculus*, the Bell Falcon, from its bell-like cry. But a recent systematist, under the same misapprehension as R. G., has proposed to alter *Tinnunculus* into *Tinnuncula* (!) because the genus to which he referred it, *Cerchneis*, is feminine.—*P. L. Slater.*

THE EARTH-WORM.—Professor Paley has added a great many interesting facts to the little-known habits of the earth-worm, but he has not exhausted the subject, and I shall only be too glad if I can add an item to what has been recorded. After some very wet days in the month of last June, I spent several hours in the dusk of evening carefully noting their actions, my great object being to discover by what means earth-worms dragged leaves, string, twigs, &c., along the ground into their holes. I knew, for I had often seen them clasp objects by their prehensile heads, twining their finely-pointed heads firmly round the object, and so draw it towards their hole, but I had reason to suspect that this, No. 1,

was their ordinary but not their only method. Very carefully and quietly placing a candle on the earth where a number of large worms were foraging round their holes, I took care to place decayed leaves, &c., within the radius of the circle swept by their operations. The objects placed within their reach were, however, too much the colour of the soil accurately and distinctly to be sure of the *modus operandi*, the thought suddenly occurred to me to try white paper. Tearing up little strips about three inches long, I gave them a single fold, and placed one within the reach of a foraging worm. Very soon its elongated head came in contact with the paper, and instead of twining its head round the paper I saw it put its head underneath. Carefully watching, I saw a lip on each side of the paper, which being compressed between the two, the paper was held firmly as in a vice, and so dragged to its hole. Continuing the experiments with my paper bait, I saw distinctly that the worm can compress and almost flatten its head as easily as it can elongate it. When the head is rendered obtuse, it can extend it on each side of the mouth so as to form two large distinct lips, between which it took hold of the papers and dragged them to the hole; but this is only method No. 2. There is yet another, which at first I could scarcely understand. Observing a worm place its head under the white paper, so that its operation was invisible, I saw the paper, without any apparent means of motion, slowly, ghost-like moving along the dark ground to the hole of the worm. Its head was not round it, nor did its lips enclose any part of the paper, and yet it moved. Quietly and carefully, by candle-light, continuing for hours my observations, I saw that when it suited the creature's purpose best, it had yet a third method of attaching itself to its baits. The worm having retracted its head in the same way as when forming its lips, firmly pressed it for a moment *on to* the paper, and then apparently forming a sucker of its mouth, the paper was firmly attached to it, and so without being held, except as the leathern toy attaches itself by exhaustion of air to the stone, the paper followed the retreating worm and was dragged to its hole. I am perfectly satisfied as the result of my patient and tiring watching therefore, that the earth-worm can secure its object just according to which method best suits the thing it desires to obtain, either by encircling a part of it with its prehensile head, by pressing it between two expansions of the head-like lips, or by attaching its head and mouth in the way of a sucker.—*W. Budden, Ipswich.*

NOTES OF GREAT TIT.—Gilbert White, in his "Selborne," says the curious notes, resembling the whetting of a saw, are the early spring song of the Marsh Tit. I have always taken it to be the Great Tit's note. Can any reader of SCIENCE-GOSSIP inform me to which of these birds the song belongs?—*C. C.*

BOTANY.

ARUM ITALICUM. — This plant is mentioned in Hooker's "Flora" as occurring in the Isle of Wight; but Bentham says the white-veined variety of *A. maculatum* from the Isle of Wight is sometimes mistaken for *A. italicum*. I have a quantity of tubers of what I believe to be the true variety at the disposal of those readers of SCIENCE-GOSSIP who would like to naturalize them, by planting some in any situation where *A. maculatum* is established, in any shady lane or hedge-row, or in their own garden. I will forward one or more on receipt of stamped envelope. Larger tubers or extra number will require two stamps for postage.—*Dr. Morton, New Brompton, Kent.*

MOULD IN HERBARIA.—May I suggest a plan that I have found to answer when a plant that has been insufficiently dried is attacked by mould. Let the sheet be taken out of herbarium and placed between two thick pieces of blotting-paper. Then iron well with hot iron, changing paper until quite dry. By that time mould will have entirely disappeared.—*Fred. W. E. S.*

HOW TO PRESERVE COLOURS OF DRIED PLANTS.—In the July part (p. 165) a correspondent inquired for a method of preserving the colour of *Primula vulgaris* and *Primula elatior* for the herbarium. If the dried plant is painted all over with a mixture of one part of nitric acid to about twenty parts of spirits of wine it will retain its colour. I have a specimen of each treated in this manner, and though they have been mounted a long time, both petals and leaves are of the freshest colour.—*Fred. W. E. S.*

FLOWERS OF HOLLYHOCK.—On reading what I wrote about the hollyhock, I perceive an ambiguity, arising probably from an error on my part in writing. From seeds proceeding from the same flower, in fact, I have nine plants, four whose flowers have been crimson, one light red, one of darker, richer colour, and one white, which has opened its flowers since I wrote to you last, besides two plants which have not flowered yet at all. Of the plants with white flowers, which came from seeds borne on a branch of the same parent plant and flowered last year, two have blossomed again this year with white flowers as before; another, a smaller plant, growing between those two, had not flowered this year till a few days ago, when I was startled by the sight of a crimson flower on a plant whose flowers last year had been white. Here is variability indeed.—*John Gibbs.*

VERBASCUM BLATTARIA.—I have found the Moth Mullein (*Verbascum blattaria*) in a waste place, near Luton, Beds. It was discovered on a hill-side, above chalk, with flints, by Mr. F. Wiseman, who brought it to me for identification. That you may be assured of its authenticity I enclose one blossom.

I would send you more, but after the most careful re-examination of the locality we can find no other specimens of it.—*J. Saunders.*

BOTANY OF DERBYSHIRE.—The Rev. W. H. Painter desires us to say that he is engaged in editing a Plant-list for Derbyshire, and would be glad to receive communications from any botanist concerning it.

SUGAR IN THE NECTAR OF FLOWERS.—This was the subject of a most interesting paper read before the recent meeting of the British Association, by Mr. A. S. Wilson, M.A., of Glasgow. Nectar, he said, is the sweet-tasted fluid secreted within the cups of flowers, and is intended to provide an inducement to cause insects to visit the flowers. These insects confer great benefit on the flowers by assuring their cross fertilization, bringing pollen from other plants and depositing it on their stigmas. The result of this is that the plant is enabled to produce seeds of much greater vigour than it otherwise would. The saccharine fluid is usually contained in the most secluded part of the flower, in order that it may be protected from rain, for, owing to the solubility and the diffusibility of sugar, were it not so protected it would speedily be transferred to parts of the plant where it could be obtained by the insects without their serving the plant in the way of cross fertilization. The colour, odour, and marking of flowers enable insects to find the nectar more easily. The importance of these insects will be apparent from the smallness of the amounts of sugar found in the flowers experimented on by Mr. Wilson. Flowers of fuchsia yielded a total of 7.59 m.m.g. of sugar; 1.69 of this was fruit sugar, and 5.9 apparently cane sugar. Of red clover each head gave a total of 7.93 m.m.g., fruit 5.95, apparent cane sugar 1.98. On each head of clover there are nearly 60 distinct florets. Calculating from these results there was the astonishing industry of the bee brought out in an extraordinary manner, for in order to obtain the kilo of sugar 7,500,000 distinct flowers must be sucked. As honey contained roughly about 75 per cent. of sugar, a bee has then to make two and a half millions of visits in order to collect a pound of honey. It was rather a curious fact that nectar should contain cane sugar, seeing that honey never did; indeed, were a vendor to sell honey containing cane sugar he would probably be prosecuted under the Adulteration Act. A change must therefore take place while the sugar is in the bee's possession—possibly through the action of the juices with which it comes in contact while in the honey-bag. As nectar is acid in its reaction it is, however, possible that the process of inversion may take place spontaneously.

PROPOSED EXPERIMENTAL GARDEN.—Mr. Laxton, Fellow and late Member of the Scientific Committee of the Royal Horticultural Society,

proposes to establish in a central locality and within easy access of London, an Experimental Garden, for the purpose of hybridising, cross-breeding, and selecting fruits, vegetables, flowers, ornamental and economic plants (chiefly hardy and half-hardy), for the raising and propagating of useful and choice novelties, scarce and little known plants of beauty and utility, and for the trial of new fruits, vegetables, flowers, &c. It is intended that all experiments shall as far as practicable be thoroughly and crucially conducted, and that each experiment with its results, whether apparently successes or failures shall be carefully and systematically recorded. The advancement of Horticulture will be the chief desideratum, but scientific and botanical considerations will be kept in view, and should available means and space be obtained, the improvement of cereals, forage, and other agricultural plants will also be sought. Amongst incidental objects will be that of testing the adaptability of introduced plants, &c., to the climate and soil of the district.

GEOLOGY.

THE EXTINCTION OF THE MAMMOTH.—Mr. H. H. Howorth read a paper on this subject, in which he examined the mode in which the Mammoth had become extinct in Siberia. His conclusion was that there had been a sudden and violent change of climate in that country, which had frozen the previously soft ground, and had also preserved the Mammoths as in a huge meat safe.

THE PIKERMÍ AND SEWALIK DEPOSITS.—Mr. W. T. Blandford, F.R.S., has recently published his reasons for concluding that the above deposits are of *Pliocene*, and not of *Miocene* age, as they have hitherto been held to be by most geologists. The nature of the marine shells at the base of the Pikermi bone-beds attests a Pliocene age. One mammal (*Bos palæindicus*) found in the Upper Sewalik deposits occurs also in the Nerbudda alluvium, where it is associated with palæolithic implements.

CARBONIFEROUS AMPHIBIA AND FISHES.—Mr. W. H. Baily, F.G.S., Palæontologist to the Irish Geological Survey, read a paper before the Geological Section of the British Association on the above subject, in which he showed that the remains of amphibians and fishes were impressed on the true coal, in a coal-seam, 3 feet thick, at Jarroo colliery, near Castleconner, county Kilkenny. All the remains were turned into carbon, one of the fishes (*Megalichthys Hibberti*) being over 3 feet in length.

NEW SPECIES OF STAR-FISH.—Mr. W. H. Baily has described a new species of Star-fish from the Lower Silurian Caradoc beds of county Wexford, Ireland, under the name of *Palasterina Kinahani*.

A PERMIAN FAUNA IN NORTH AMERICA.—At the British Association meeting Prof. Cope described the remains of a fauna characteristic of the period which in North America succeeded the Carboniferous. It occurs in Illinois, and the remains were referred to Reptilia and Batrachia. In one genus, *Clepsydrops*, almost the entire skeleton was discovered. This was a clawed Lizard, with large canine teeth, and several incisors.

NOTES AND QUERIES.

TOADS IN STONE.—The stories concerning live toads which have been found inside limestone rocks are so well known and often well authenticated, that the fact can hardly be doubted. The article by Mr. Downes in your last number would seem to offer a good explanation of the phenomena. Any one who has observed the way in which the so-called "petri-fying wells" at Matlock and other places deposit thick crusts on any articles placed in them, will easily perceive how the working up of a toad in a rock may be a question not of years but of months. We must remember, too, that though the independent testimony of quarrymen from many places remote from each other ought not to be set down as mere invention, yet exaggeration with regard to the thickness or solidity of the rock is very likely to take place. A short while ago, however, a curious story was told me about a toad having been found in the heart of an oak-tree. The toad was an enormously large one, and the impression of its body was plainly to be seen. When I saw the article in your last number, I wrote for further particulars, and have to-day received a reply to the following effect,—that the time was thirty or forty years ago, that the tree was a large oak in Pignell Wood in the New Forest, that it was cut in the spring of the year. The three men who cut the tree are dead, but my informant, who is getting an old man, well remembered the circumstances, and, I believe, was on the spot a short time after the tree was cut and saw the impression; at any rate, the circumstance seems to be well remembered by him. I give the fact on its own merits, hoping that it may call forth an answer in explanation or otherwise.—*W. W. Fowler, Repton, Burton-on-Trent.*

TOADS IN ROCKS.—To those interested in the subject of the frog and toad living without food, the following may be interesting:—In the Spring of 1876 I had occasion to go down a well, at Lewisham, to examine some pumps. Looking round for a place to put a few tools, I took out a loose brick from the side of the well, and, while putting my tools into the hole, felt something soft and cold, which turned out to be a frog: it was very thin and weak. I took it to the surface and carefully put it in a suitable place. The next day it had breathed its last; it was nothing but skin and bone. On making inquiries, I ascertained that during the Spring of 1875, while the pumps were being repaired, the frog had fallen down the well, and had been picked up and imprisoned, thus having been buried forty feet from the surface about twelve months. Its death, no doubt, was accelerated by the exertions it made to procure food. Shortly after this I was at Crayford Water-works, and mentioning the above circumstance to one of the turncocks, he told me that about twenty years previously he had put a toad into the hollow column of a drilling-machine he was helping to put up at a works at New Cross. I obtained permission to look

into the column of this drill-machine, and there, sure enough, was the remains of the toad, nothing now but a few bones and dirt. By its side was the wick of a tallow candle, but no trace of the tallow was left; possibly the toad had eaten the tallow, or, perhaps, the tallow had decomposed. I should state that the column was perfectly air-tight, and, as far as I could learn, had never been opened. It was about four feet high and seven or eight inches in diameter inside. The air inside was foul, as a light would not burn. Without comment, I leave these two instances to speak for themselves.—*M. O. Haydon.*

THE LONGEVITY OF TOADS.—I have read in the last number of SCIENCE-GOSSIP, the account, by Mr. W. Downes, of a live toad having been found in limestone rock. I believe there are several well-authenticated instances of that nature, one of which I now send you. My informant is a personal friend, and a well-known mining-engineer of great celebrity. About two years ago, in a Yorkshire coal-seam 600 yards below the surface, a live toad was found in the middle of a block of coal. My informant was not present at the moment, but within half an hour he saw the toad, then dead, and the hole out of which it came. He had no doubt whatever as to the truth of the collier's statement that the toad was in the hole alive at the time he broke the lump with his pick, and came out apparently unhurt, but lived only about twenty minutes. I believe my friend has the toad in his possession.—*J. D. Shakespear.*

TERATOLOGY OF LEAVES, &c.—I think the enclosed leaves as curious as the Cabbage-leaf of your last number of SCIENCE-GOSSIP. We received from South Africa some seeds of *Cobia Capensis* and some of *Mimosa*. We conclude, from the result, that a seed of each was set in one pot, as two distinct plants, yet united at the bottom of the stem, came up, and, as you see, there is a second freak in the union of the two plants. Can you tell me if this is only a freak of nature, or is there a plant that is always so?—*B. H. Kirby.*

GOAT CATERPILLARS.—Can any of the readers of SCIENCE-GOSSIP say whether there are any means of saving trees which have become infested by these caterpillars, and of preventing their spread to others in the same garden, other than cutting down and destroying the tree? If any know of a remedy, and would state it, it would greatly oblige, and save some valuable trees in this neighbourhood.—*A. Warner, Hoddesdon.*

BEHAVIOUR OF LIGHTNING DURING THUNDER-STORMS.—A friend and myself were talking of thunderstorms, apropos of the late ones, when he spoke of the lightning as having been observed by him leaving the earth and shooting up towards the sky. This, I replied, was owing to the position of the clouds, as electric fluid never left the earth in that manner during a storm, but might be seen darting from cloud to cloud. He, however, affirmed that it did so, and referred me to a work by Captain Snow Harris for confirmation of what he had seen. He also said that when trees or buildings were struck the injury was often done by the electric fluid leaving the earth, not, as I always supposed, attracted to it, and that the nature of its track displayed the fact. As I still doubt whether it be so or no, will you kindly settle the dispute?—*J. H. G.*

ROOTS OF THE PALM-TREE.—Two sermons have been preached lately in our neighbourhood on Psalm

xcii. 12, "The righteous shall flourish like the palm-tree." In the first sermon special mention was made of, and a lesson was drawn from, the tap-root which we were told a palm-tree possessed. The second preacher, ignorant of the previous sermon, told us that a palm-tree had no tap-root like most other trees, and drew a lesson from its absence. "Where doctors differ disciples disagree." We should be greatly obliged if any correspondent of SCIENCE-GOSSIP could tell us whether palm-trees have tap-roots or not.—*A. B.*

PRESERVING ANIMALS.—The whole of the "modus operandi" of Waterton's method, most exactly described, may be found in the end of his "Wanderings in America." The early editions of this work are scarce, but I am happy to say a new one has lately been issued, price 3/6, and may be obtained of any bookseller, from the London houses. *W. Barrett-Rowe, Bristol.*

PRESERVING SLUGS.—In "Rambles in Search of Shells," and also in the article on "Land and Fresh-water Shells" in the "Notes on Collecting and Preserving Natural History Objects," the following receipt is given for preserving slugs. "Make a cold saturated solution of corrosive sublimate; put it in a deep wide-mouthed jar or bottle, then take a slug you wish to preserve and let it crawl on a long slip of card. When the tentacles are fully expanded, plunge it suddenly into the solution; in a few minutes it will die with the tentacles extended in the most lifelike manner, so much so, indeed, that if taken out of the fluid it would be difficult to say whether it were alive or dead." I have tried this repeatedly, and have never yet succeeded in obtaining one specimen with the tentacles extended. In most cases the head of the slug, when it is dead, protrudes a little outside the mantle, but there is no sign of a tentacle in any of them. I should be glad if any of the readers of SCIENCE-GOSSIP would give me information about the preservation of slugs, as I am anxious to obtain them for my collection of land and fresh-water shells. In the same books it is also stated that the best mounting fluid is glycerine and water in the proportions of one to one and one-half. But I find that the fluid becomes coloured a deep yellowish brown soon after the slug is put into it.—*B. E. Smith.*

GREY LAG.—In answer to "G. L.'s" inquiry concerning "Grey Lag," as applied to the goose, I beg to draw attention to the Cumbrian word *laghter*, brood of chickens, setting of eggs, which is from the A. S. *leggan* to lay (eggs). The Grey Lag may therefore be the *Grey Egg-layer*.—*J. C. Clough.*

GREEN HASTINGS.—This cry undoubtedly is a corruption of Green "Hasties," for Cohan, in "The Hauen of Health," black letter edition of 1584, says, "There be three sortes of Pease common among us in Englande,—the first garden pease or hastie pease. The seconde sorte is called graie pease. The thirde greene pease, both growing in the fieldes." He then gives the cooking of them at that time, and states that "The two first sortes are used to bee eaten greene before they be full ripe. First they are sodden, then buttered, salted, and peppered. But if any student list to eate greene Beanes or greene pease, let him spare no pepper upon them, for this is a generall rule in Galen for meates that be windie." Also it appears at that day bread was made from peas, as further on he says, "If pease be unwholesome, then the bread which is made of them is unwholesome; yet it is much used in Lecestershire. But I leave it to Rusticks,

who have stomachs like Ostriges, that can digest hard yron."—*W. H.*

STRANGE FRIENDS.—In my parish, Lordington (Sussex), dwells a pretty little chestnut pony, of advanced years, who has been turned out to end his days exempt from toil; and in the same park is a white goose who has gone round the world with the British fleet. Between these dissimilar animals a friendship has sprung up. When any stranger approaches the goose, it waddles off cackling towards the pony, apparently for protection. The goose was, doubtless, a great pet with the sailors. Has any one observed a like anserine attachment?—*F. W. Arnold.*

MIGRATING BIRDS.—On dark nights from August all through the autumn I often hear birds passing over here. They make a constant whistling or piping noise, and begin to come over as soon as it is dark. They appear to fly in a westerly or south-westerly direction. I have never seen any of them, because it is only on dark nights that we hear these birds. Sometimes they seem quite close, just above the house-tops. At the end of August in 1875, several letters appeared in the *Times* about this migration. One correspondent said, "Soon after eight o'clock on the evening of Saturday, the 28th instant, my attention was drawn to a strange noise over my house. It was raining in torrents at the time, but I could distinctly hear, above the pelting of the storm, shrill cries, somewhat resembling the note of the Sandpiper, and the flapping of innumerable wings. This continued with scarcely any intermission for hours, at any rate until after twelve o'clock." This was eighteen or twenty miles from Maidstone. Another correspondent said, "These birds are frequently heard at Dover, and generally on 'dirty nights.'" I heard them here, for the first time this year, on Friday, the 2nd of August, and again on the following Sunday night, about ten o'clock. Are they Curlews and Sandpipers, and how far does their migration extend? Perhaps some of your readers could inform me.—*Henry Lamb, Maidstone.*

COLOURS OF DRIED PRIMROSES.—A lady friend has been very successful in preserving the colour of the petals of *Primula vulgaris* by adopting the following simple method. As soon as possible after being gathered, the plant must be killed by washing the roots for two or three minutes in boiling water, then dried with a soft cloth, and immediately transferred to the drying papers, which should be well warmed at the fire, and changed frequently, until the plant is perfectly dry. The corollas of a number of specimens she has treated in this way have preserved all their original beauty of colour, and the leaves have also retained their natural appearance. Some I myself dried, without first subjecting them to the hot water treatment, lost their natural colour, and changed to the bright green, which has annoyed so many collectors. I have been very successful in drying Orchids, by following the instructions given on page 88 of SCIENCE-GOSSIP for 1873, where it is recommended to dip the root and leaves in boiling water for a few minutes previously to putting the specimens in the press.—*R. Standen, Goosnargh, Lancashire.*

GEOLOGY OF NORTH DEVON.—If "W. Downes" would kindly give a few particulars as to his "finds" in this district, and a few hints as to localities, he would greatly oblige a native, who is now an occasional visitor, and would be glad to make the most of his time at his next visit.—*W. G.*

SEA ANEMONES.—I should be obliged if "C. A. Crimes" would kindly state in the next number of

SCIENCE-GOSSIP how he feeds the baby sea anemones, as I find it an utter impossibility to make them take the food. After their birth does he leave them where they are or move them? I should also like to know whether he has any peculiar treatment for his *Bunodes gemmacea*, as I have been most unfortunate with mine. Within a few days of placing them in the tank they have a decomposed appearance, the colour fades, and they are covered with a sort of slime. *Sagartia venusta* I have succeeded very well with, and also *Sagartia bellis*, but the "gem" invariably dies directly. We once kept a *Tealia crassicornis* for three years, but this also seems a very difficult one to manage.—*C. E. R.*

PROTECTION FROM FOREST FLIES.—Having received personal benefit from the remarks in SCIENCE-GOSSIP on the Harvest Bug, I send a perfectly trustworthy recipe for the protection of horses from the Forest Fly. Smear the face and flanks well with parafin oil. I have been here nearly three weeks with my two young ponies; they are not foresters, and one cannot stand the fly at all without the oil.—*Catherine Middleton, Lyndhurst.*

BIRDS' EGGS IN WRONG NESTS.—The communications of Messrs. C. H. Sharp and A. F. Griffith on the above subject brings to my recollection an incident which happened in the north of Aberdeenshire, in 1865. When walking along the banks of a stream which ran through a wood, my cousin disturbed a wild duck sitting on, and attempting to cover, eleven wild ducks and thirteen pheasant's eggs, which were all crowded together in the same nest.—*A. M., M'c A., Stoke-on-Trent.*

WILD AND TAME DUCKS.—A pair of wild ducks located themselves on a moat surrounding the house of a friend of mine last October. During the severe weather they came to the feeding-place of the domestic ones, but otherwise kept themselves separate. In the spring, a tame duck hatched a brood of young ones near the haunt of the wild ducks, which now it is supposed were destroyed by them. Soon afterwards, the tame duck, whose brood was lost, was caught in the act of drowning the progeny of the wild duck, and succeeded in killing five of them before being discovered. She was at once sent off to another farm. In the same moat, several moor hens have reared their young for years, taking their departure regularly every winter.—*J. Wiggin.*

BARBOTS.—I enclose the following cutting from a newspaper, and shall be glad if any of the readers of SCIENCE-GOSSIP can tell me more of these insects (?). The name is quite new to me. Are they only to be found there? *Calignani* states that a terrible accident has just taken place at Biarritz. Miss Gordon, who had passed the winter in Paris, was drowned while out on an excursion. She attempted, without a guide, to go along the cliffs far beyond the point marked by the authorities as the limit for the public to go safely. She reached a place known as the Falaise de la Mort, and in stooping to pick a flower, her foot slipped, and she was precipitated into a hole known as the Barbots, a spot said to have this peculiarity, that at the end of forty-eight hours nothing more than the skeleton remains of any beings which fall into it. It contains millions of small insects which devour the body, and which are called by the inhabitants of the district barbots, and are by them held in especial horror. The Duke de Frias met his death under similar circumstances a few years ago.

EGG DRILLS.—Where are Egg Drills, described and figured at pp. 30 and 31 of "Notes on Collecting and Preserving Natural History Objects," to be obtained? As far as I know, they are not to be had at any of the naturalists' shops in London, where only very inferior implements for this purpose are sold.—*Beta*.

BIRDS SINGING AT MIDNIGHT.—Extract from the *Standard*, Feb. 22, 1878.—"W. F. E.," writing on the above subject, mentions something much more remarkable in the history of our singing-birds which has occurred in the immediate neighbourhood of Little Chart Rectory, Charing, Kent, within the last few days. Between the hours of eleven and twelve o'clock on the night of Friday last, the 15th inst., on Saturday night, and again on Sunday night, at the same hour, the blackbirds and thrushes were singing, whilst the smaller birds in the hedgerows were chirruping and twittering just as you hear them in the early morning in summer. He himself listened to them with open door and window, and he has been told by several who were out on those nights—the neighbouring doctor amongst the number—that they heard with wonder this, at such an hour, unusual melody."

BIRDS SINGING AT MIDNIGHT.—The singing of thrushes, robins, and other birds for several nights in succession, during February last—although, doubtless, accounted for by the singular beauty of the weather about that time—is such an unusual occurrence, that I should be very glad to hear of it prevailing generally in the country.—*X*.

BROTHERLY LOVE IN A GUINEA-PIG.—Some years ago I possessed a guinea-pig which had never shown any more wisdom than the rest of its species. One day a friend gave me a young rabbit which he had caught in a neighbouring warren, and I put it into the guinea-pig's cage. I was somewhat astonished to see the guinea-pig feed the rabbit with clover and other vegetables provided for its own nourishment. It also gave up to it the snugest part of the cage. The guinea-pig continued these attentions till the rabbit was sent back to its native warren, when the unfortunate guinea-pig expressed its anguish in most pitiful cries.—*Anna Ward, Belfast*.

PHOSPHORUS IN SALT WATER.—I have observed that when thunder is prevalent, the flashes of light in sea water, occasioned by phosphorus, are much more numerous and distinct.—*A. Ward, Belfast*.

RANUNCULUS REPENS.—I have never heard the name "Devil's-claw" applied to this plant. In this part of Somerset it goes by the name of "Ram's-claws," as its long trailing stems are a great annoyance to the rakers in the hay-field.—*W. Herridge, Cucklington*.

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

G. A. H. (Manchester).—No. 1. *Viola Curtisii*, a very characteristic specimen; No. 2. Some form of *Viola tricolor*, probably *V. Mackaili*; No. 3. *Statice auriculata*, Vahl; No. 4. *Sagina apetalata*.

E. H. (London).—No. 1. Everlasting Pea (*Lathyrus sylvestris*, L.); No. 2. *Erigeron*, sp.; No. 3. It is difficult to name a species from leaves only, but we believe your example to be *Oxalis acetosella*, L.

J. A. W. (Darlington).—No. 1. *Cerastium triviale*; No. 2. Mountain Willow-herb (*Epilobium montanum*); No. 3. Meadow Pea (*Lathyrus pratensis*, L.); No. 4. Common Valerian (*Palestina officinalis*); No. 5. Restharrow (*Ononis spinosa*); No. 6. Bedstraw (*Galium verum*); No. 7. *Anagallis tenella*.

CUJAS (Beaulieu, Glasgow, N.B.).—Your specimens are as follow: No. 1. Bog Asphodel (*Narthecium ossifragum*); No. 2. Bur Marigold (*Bidens tripartita*); No. 3. Rough Chervil (*Chaerophyllum temulum*); No. 4. Winter Green (*Trientalis europaea*); No. 5. Hogweed (*Heracleum sphondylium*); No. 6. Field Gentian (*Gentiana campestris*, L.); No. 7. Stitchwort (*Stellaria grandiflora*); No. 8. Earth-nut (*Bunium flexuosum*); No. 9. Red Dead Nettle (*Lamium purpureum*); No. 10. A very curious and remarkable monstrosity of No. 5; we hope to figure it in our columns shortly; No. 11. Dead Nettle (*Lamium amplexicaule*); No. 12. Lesser Spearwort (*Ranunculus flammula*).

Q. Q. (Elie Fife).—Unfortunately your example came to hand in a poor state to determine; it was partly decayed; it may prove to be *Lycium barbarum*; have you another specimen?

B. D. (Newport).—It is *Cirsium oleraceum*. We cannot tell why it is so named. Some of our thistles are edible.

E. W. (Bristol).—The Carex you send is *Carex paludosa*; it is nearly allied to *C. riparia*.

J. C. W. (Salterton, Devon).—No. 1 and No. 2 are both *Lotus tenuis*, Kit. According to Hooker a sub-species of *L. corniculatus*, L.; but it is readily distinguished from that species by its filiform and often shrubby stems.

G. W. BELL.—See article in SCIENCE-GOSSIP for July, 1877, by Mr. J. Young, F.G.S., on "How to Clean Fossil Polyzoa."

A SUBSCRIBER.—The best book on British Butterflies and Moths is unquestionably that of E. Newman. But they will find illustrations of every species except the Micro-lepidoptera. Morris's "British Moths" contains coloured plates, but they are not so faithful as Newman's woodcuts.

W. G. PIPER.—The lias, both at Lyme Regis and in the neighbourhood of Whitby, is full of fossils. A capital hunting-ground may be found at Aust Cliff, on the Severn, near New Passage, where there is an abundance of Rhaetic fossils. The carboniferous limestone at Castleton, Derbyshire, is a splendid fossil locality. The tertiary beds in the Isle of Wight are also exceedingly fossiliferous.

C. E. R.—You can purchase Sea-Anemones of Mr. King, Seahorse House, Portland-road, London.

F. W. E. S.—Your article will appear shortly in our pages.

J. W. S. (Sheffield).—Your exchange exceeds the three lines allowed gratis, and would have to be charged as an advertisement.

ESSEX.—The insect you trod upon which gave forth a phosphorescent light was most probably *Geophilus electricus*, one of the Millipedes.

J. R. MURDOCH.—Your Mosses are:—No. 1. *Hypnum Sendtneri*; 2. *Hypnum purum*; 3. *Hypnum tamariscinum*; 4. *Hypnum loreum*; 5. *Hypnum piliferum*; 6. *Hypnum Kneiffii*; 7. *Dicranella squarrosa*; 8. *Hypnum lutescens*; 10. *Hypnum splendens*; 11. *Neckera complanata*; 12. *Hypnum mysosroides*; 13. *Bartramia fontana*; 14. *Homalia trichomanoides*, Hepaticæ; 9. *Mudrochea platyphylla*; 15. *Plagiochila asplenoides*; 16. *Scapania nemorosa*.

A. COLE.—Your Mosses are:—No. 1. *Sphagnum fimbriatum*; 2. *Sphagnum acutifolium*; 3. *Sphagnum subsecundum* (var. *contortum*); 4. *Sphagnum cymbifolium* (var. *squarrosulum*); 11. *Sphagnum cuspidatum*; 5. *Hypnum flagellare*; 6. *Dicranum scoparium* (young); 7. *Hypnum rivulare*; 8. *Ceratodon purpureus*; 9. *Bryum caespiticium*; 10. *Hypnum serpens*; 12. *Hypnum sericeum*.

A BEGINNER.—The insect you describe was most probably one of the Hornet Clear-wings, a moth which simulates the appearance of the true Hornet in a remarkable degree. See Newman's "British Moths."

A. W. A.—I here is a capital old-established Naturalists' Field Club in Liverpool, whose subscription is low, that would suit you and such as you, and we feel certain it would welcome artisan-naturalists. The president is the Rev. H. H. Higgins.

C. H. G.—The caterpillar of your moth had been attacked during life by an ichneumon (a not uncommon thing), and the ichneumon had deposited its eggs in the tissues of the caterpillar. These subsequently hatched into the condition you found them in, at the expense of their host.

X.—Your packet contained some of the purifying lime used in gas-works.

J. KIRKHAM.—The six ivory slides are very heterogeneous as to objects, and old-fashioned. No. 1 contains a piece of Red Seaweed (*Placanium*) and of a Sea-fir (*Sertularia argentea*); No. 2 shows works, legs, &c. of some orthopteran insects; No. 3. Fish-skin, Feather-barbule, &c.; No. 4. pieces of Snake-skin and part of a Beetle; No. 5. Coral-sand, portion of Diamond Beetle, of Sea-mat (*Flustra*), &c.; No. 6. piece of *Cora lina officinalis* (a sea-weed), of *Flustra*, and a group of Foraminifera (*Globigerina*). Please send us your address, as we have mislaid it.

UNDERGRADUATE.—The "rough" sketches will only permit of a rough guess at the names of the objects delineated:—No. 1 are possibly the fragments of species of some Echinoderm (*Spatangus* or *Ophiocoma*; 2. *Polytomella*; 3. *Rotalina*; 4. *Heliopelta Metii* (diatom); 5. *Cingulum* or connecting zone of some discoid diatom; 6. *Actinophylax* (diatom); 7. *Coscinodiscus lineatus* (diatom); 8. *Actiniscus Sirius* (diatom); 9 and 10. Upper and lower apices of *Sceptroneis caduceus* (diatom).

EXCHANGES.

WANTED, in exchange or for purchase, "Natural History Review" for years 1854 and 1855 (bound or in parts, latter preferred) and following numbers:—April, 1856; April, 1858; April and October, 1860. I have some odd numbers of same work, if required.—Alpha, 18, Upper Fitzwilliam-street, Dublin.

A STUDENT in pathology, having constant opportunities of procuring specimens in bulk (physiological and pathological), would be happy to send his duplicates, hardened in spirit and ready for making sections, to any gentleman, in exchange for Natural History specimens. Further particulars by letter.—W. Barrett Roné, 165, White Ladies'-road, Bristol.

SEVERAL Natural History curiosities to exchange, including Bat (stuffed), Python (stuffed), and a fine specimen of the Goliath Beetle; also a new copy of Rye's "British Beetles" (10s. 6d.). Wanted, Wood's "Insects at Home" or "Abroad," Lewes' "Sea-side Studies," British or Foreign Lepidoptera and side-blown Birds' Eggs.—W. Barrett Roné, 165, White Ladies'-road, Bristol.

OAK-feeding Silkworm Moth (*Yama Maii*) for portion of a wing. Send a stamped directed envelope to W. H. Gomm, Sandwich, Kent.

WELL-MOUNTED sections of Sponges in balsam, showing spicula *in situ*: *Grantia compressa*, *Hymeniacidon suberea*, *H. carunculata*, *Halichondria panicea*, offered for unmounted pieces of Pachymatisma, Spongilla, &c.—T. H. Buffham, Clarendon-road, Walthamstow.

SEVERAL hundred Silkworms' Eggs for exchange, for Micro- or other objects of interest.—Mrs. Skilton, London-road, Brentford.

OFFERED, *Unio margaritifera* from river Tay. Wanted, Anodonta, or other good freshwater or land-shells.—Address, Henry Coates, Bridgend House, Perth, N.B.

WANTED, Slides or Material, Tricraterium, Diatoms, and Foraminifera, for well-mounted Slides, Alyssum, Eleagnus, Onosma. Material of same or other slides in exchange.—E. W. Burgess, 35, Langham-street, London, W.

WANTED, Harvest Bugs, *Trombidium autumnale*. First-class slides in exchange.—E. W., 48, Tellington-road, Holloway, N.

GOOD Microscopic Slides in exchange for any of Hugh Miller's works, or a good turn-table.—E. Edwards, 8, St. John's Cottages, Penze, S.E.

OFFERED, Nos. 42, 133, 164, 165, 185, 206, 242, 273, 386, 389, 390, 451, 452, 520, 550, 634, 729, 753, 761, 773, 834, 841 b, 1015, 1517, 1049, 1131, 1259, 1406, 1501, 1571, 1572, in exchange for rare British plants.—W. J. Hannan, 6, Tatton-street, Ashton-under-Lyne.

LONDON CATALOGUE, 7th ed. wanted, 5, 7, 19, 23, 25, 61, and others, for 241, 120, 171, 804, 1136, 1379, and many others.—Miss H., 75, Todmorden-road, Burnley.

For a few scales of any six of the following send well-mounted object:—Greater Weever, Black Bream, Athereine Smelt, Blue and Ballan Whass, Grey Mullet, Sapphirine, Red and Streaked Gurnards, Bass, Tench, Rudd, Roach, Dace; also, skin of Spotted Dogfish and Picked Dogfish.—E. M., 20, Croyley-street, New North-road, London.

For exchange, upwards of five dozen microscope slides, chiefly parasites, wanted in exchange, parasites, either mounted or unmounted.—W. A. Hyslop, 22, Palmerston-place, Edinburgh.

PALATES of *Helix aspersa* and *Patella vulgaris*, neatly mounted, in exchange for good slides or material.—J. Blacksham, 78, Lozell's-road, Birmingham.

ROSA *tomentilla*, *dumetorum*, *Ruterii*, &c., for *Caltha Guerauerii*, *Digitaria humifusa*, and other Rosae and Rubi.—G. C. Druce, Northampton.

WANTED, Rubbings of Monumental Brass from all parts of England: exchange natural objects, Rubbings from Kentish churches, or Curiosities. Have SCIENCE-GOSSIP from commencement.—F. Stanley, 6, Clifton Gardens, Margate.

BRITISH Land, Freshwater, and Marine Shells, and British Lepidoptera, offered for British Marine Shells or foreign Helices.—Thomas H. Hedworth, Dunston, Gateshead.

BIRDS' EGGS, side-blown, labelled, picked, well-marked specimens. Wanted, side-blown specimens of many varieties.—Henry Sissons, Westbourne-road, Sheffield.

F. S. COLLINS, 26, Tremont-street, Boston, Mass., U.S.A., would like to exchange American Algae for English or others.

WANTED, Rev. J. G. Wood's "Insects at Home" and "Insects Abroad," or any similar works, for foreign insects, mounted or unmounted, chiefly parasites.—M., Anglesy Lodge, Godalming, Surrey.

To Conchologists, resident at home, abroad, or in the Colonies.—Having duplicates of nearly 100 species of the British Land and Freshwater Shells, including many of the rarer British Vertigos, such as *Substriata minutissima*, *Alpestris*, *Pusilla*, and *Angustior*, would be glad to exchange these for foreign or colonial shells equally good. Also in duplicate, *Limnea involutus* and *Succinea oblonga*, for other English, Land, and Freshwater Shells, in quantities suitable for foreign exchanges; many common species required.—W. Sutton, Upper Claremont, Newcastle-on-Tyne.

SIDE-BLOWN Eggs.—Many very rare specimens for exchange, mostly marked with collectors' own marks for identification. Wanted, Woodcocks, Ruffs, Puffins, Nighthawks, Shags, Wag-tails, Hobies; also, American and other foreign species.—Sissons, Sharrow, Sheffield.

FOR injected human Kidney, stained section of human Intestine, and Japanese Grass, all in balsam, send pure gatherings of diatoms, or any well-mounted balsam slide, to J. A. Kay, Mansion House, Brompton, Chatham, Kent.

"HALF-Hours in the Green Lanes," new and clean, offered for Lepidoptera, or books on Entomology.—A. Wheldon, 8, Albion-street, Darlington.

NUMBER of first class Anatomical Slides wanted, for first slides or material; send sample and list for sample and list to James Green, the Cross, March.

CRETACEOUS Fossils to exchange for others. Also, wanted, good books on Palaeontology. State price, &c.—J. A. Floyd, Alcester, Warwickshire.

WANTED, in exchange for well-mounted microscopic slides, SCIENCE-GOSSIP for 1870, unbound; also, 1865-66-67. List sent to choose.—W. Wise, Broad-street, Launceston.

OFFERED Nos. 68, 70, 140, 233, 284c, 625, 682, 1071, 1074, 1341 and b, 1577, 1600, 1634c,—for 4b, 6bc, 15b, 18c, 23, 28b, 32, 37, 48b, 50, 50b, 52b, 57b, and Malva Borealis. Lists exchanged.—C. A. O., 30, Queen's-road, Hastings.

L. C., 7th edition, Nos. 135, 146, 176, 235, 237, 246, 369, 527, 556, 611, 702, 730, 767, 769, 858, 864, 882, 913, 929, 988, 999, 1130, 1140, 1262, 1332, 1485, 1519, 1615, and many others, in exchange for other rare species. Send list to J. Temperer, 10, Heald-place, Rusholme, Manchester.

WITHERING on British Plants, 4 vols. cloth, 1830, Quekett's Lectures on Histology, 2 vols. cloth, 1852, in exchange for unmounted British Mosses, British Birds' Eggs or offers.—J. R. Murdoch, Horsforth, near Leeds.

GREEN Woodpecker, Red Grouse, Sparrow-hawk, Long-eared Owl, Pochard, and pair of Water-hens, in separate cases, in exchange for Microscope or offers.—J. R. Murdoch, Horsforth, near Leeds.

BOOKS, &c., RECEIVED.

"Flowers; their Origin, Shapes, Perfumes, and Colours." By J. E. Taylor, Ph.D., F.L.S., &c. Second edition. London: Hardwicke & Bogue.

"Alphabetical Handbook to England and Wales." London: John Murray.

"The Sight, and how to Preserve it." By H. C. Angell, M.D. London: Hardwicke & Bogue.

"The Speaking Telephone, Talking Phonograph, and other Novelties." By George B. Prescott. New York: Appleton & Co.

"Boston Journal of Chemistry." September.

"American Journal of Microscopy." "

"Land and Water." "

"Midland Naturalist." "

"Chambers's Journal." "

"Ben. Brierley's Journal." "

"Botanische Zeitung," August.

"Science pour Tous."

Various Pamphlets.

&c. &c. &c.

COMMUNICATIONS RECEIVED UP TO 10TH ULT., FROM:—F. K.—C. H. G.—G. C. J. W.—E. D. R.—E. E.—T. S.—E. H.—C. M.—D. D.—T. L.—W. J. H.—A. B.—G. C. B.—E. W.—X. C.—J. W.—A. W.—E. W.—B. W.—H. R.—D. A.—H. B.—A. J.—J. B.—J. M.—G. D.—H. E. W.—Dr. G. A. S.—W. H. N.—C. H. B.—J. R. M.—E. T. C. W.—K. D.—J. C. W.—P. L. S.—W. W. S.—M. G.—H. C. C. M.—W. B. R.—J. A. W.—G. R. R.—J. K.—Col. B.—W. F.—W. W. F.—J. L.—H. C.—J. H. M.—A. T.—G. M. P.—Mrs. S.—I. C.—W. H. G.—B. H. K.—J. D. S.—G. D. S.—W. C. A.—W. A.—T. H. B.—G. S. H.—Dr. J. H. G.—J. G.—Dr. P.—Col. M.—J. W. N.—C. E. R.—T. S.—J. C. C.—Dr. M.—W. M. C. C. S.—F. W. E. S.—W. A.—W. C.—W. W.—W. H. W.—H. L.—F. S.—C.—J. W. S.—R. S.—F. H. A.—J. F. S.—J. R. M.—H. J. B.—W. G.—G. C. D.—T. H. H.—H. S.—J. C. S.—M. R. T. G.—F. S. C.—W. H. P.—W. W. F.—E. C.—W. H.—W. H. B.—R. A. B.—H. C. C.—J. B.—A. B.—W. A. H.—J. G.—J. C. C.—M. J. W.—C. A. O.—B. S.—B. E. S.—J. A. K.—Prof. J. T.—W. P. F.—J. A. F.—W. W.—A. W.—H. T. S.—G. P.—W. B.—O. P. C.—E. M.—W. G. P.—S. F.—W. G.—G. W. B.—&c. &c.



QUARTZ, AS IT OCCURS IN THE LAKE DISTRICT: ITS STRUCTURE AND ITS HISTORY.

PART II.

By J. CLIFTON WARD, F.G.S., F.R.M.S., &c.



QUARTZ AS A MICROSCOPIC STUDY:—

Having enumerated the various forms and conditions under which quartz is found in the Lake District rocks, I wish to say something about its internal structure as revealed by the microscope.

The method of study is this:—The fragments of quartz, or the rocks containing quartz, are sliced very thin and mounted, the slice being reduced to such a degree of thinness as to allow of its ready examination by transmitted light.

At the outset let us find out what can be the difference between a piece of opaque white quartz and clear transparent rock crystal. The difference is somewhat similar to that between a piece of opaque ice and a piece of glassy transparent ice; for if water be frozen very quickly, a large number of air-bubbles will be entrapped, while slow freezing enables the air to escape. Or, again, take a handful of snow,—it is white, but decidedly opaque. Though formed of clear crystals of ice, air is so mixed up with them that the rays of light, constantly suffering reflection from the limiting surfaces of the two, are unable to pass through the mass. Subject such a mass of snow crystals, however, to powerful pressure, the air will be squeezed out and the formerly opaque snow may be converted into a block of transparent ice. Reverse the experiment; pound up your block of clear ice, and once more you have an opaque white powder, the minute icy particles being separated from one another by air. The same may be done with a transparent quartz crystal: grind it to powder, and the powder is found to be opaque and white.

Hence, may we not conclude that the difference between clear rock-crystal and opaque white vein-

quartz is that, while in the case of the transparent quartz there is nothing or but little to reflect the rays of light or to prevent their passing uninterruptedly through the mass, in the case of the opaque white quartz there must be something included which acts in the same manner as the air-bubbles in opaque or cat's ice, as it is called? The microscope reveals what this something is.

Take a piece of ordinary vein-quartz, and examine a thin slice of the same; every part of the field of view is seen to be full of little cells of very various form, some round, some long drawn out, some branched, and some even having a regular and what appears like a crystalline outline. Examine them more closely, and each little cell is seen to contain a bubble, sometimes large, and more or less flattened by the sides of the cavity, and unmovable; sometimes like the bubble in a spirit-level, moving sluggishly from end to end of a tube-like cell; and sometimes very small, and moving about freely in the cell, like a thing of life, perhaps visiting all parts of the cell in turn, occasionally becoming hazy and indistinct, because, passing to a deeper part of the cell, the bubble has gone slightly out of focus. If the cell, too, be very small, the bubble, owing to its extreme minuteness, may seem like a mere black speck; and in these cases the motion is exceedingly active, and reminds one still more of a living organism. What can these things mean? For a bubble to move thus freely about, all analogy would lead us to suppose that the cell must be full of liquid, except the bubble-spot, otherwise this free motion would be impossible. What, then, is the liquid? and what does the bubble contain? Mr. Sorby has paid great attention to these interesting facts, and has clearly proved: 1st, that the liquid in most cases is water; 2nd, that the bubble is a vacuum, or empty spot, when the movement in the cell is very free; and 3rd, that the water is frequently saline, and sometimes the cells contain small cubical crystals of salt. Thus we

have the astounding fact revealed to us, that in every small fragment of opaque quartz there are thousands upon thousands of these minute liquid parcels shut up within it, and each containing a vacuous bubble. Again, we ask, what can this mean? Can it be that water has had so large a part to play in the formation of this hard mineral quartz, that granite, which we used to look upon as a molten rock formed in the bowels of the earth, can yet have been formed largely in connection with water? for the quartz combining with felspar and mica to form granite is literally full of these minute water-cavities. Let us see how this can be in the case of granite, and then other quartz occurrences may prove easier to understand. Mr. Sorby has made many and delicate researches into this subject, and he has found that on subjecting the liquid cavities to heat, first, any minute crystals of salt contained in them are slowly dissolved; and second, that when the heat is made sufficiently extreme the minute bubble becomes smaller and smaller until finally the liquid fills the whole cavity, the bubble completely disappearing. Now it is evident that these little parcels of water must have been enclosed within the quartz on its solidification, when the granite was being formed deep beneath the surface, for all geological evidence goes to show that granite is deep-seated in its formation; although of various ages, yet no other rock is ever found beneath it. Therefore, it is further evident that when first enclosed the water must have been in a highly heated condition, and unable to attain the state of vapour by reason of the great pressure to which it was subject, so that we may regard the liquid now contained in the quartz as part of the original mother-liquor, if I may use the term, which, together with a heated condition of other minerals, and great pressure, made up the conditions under which the granite was formed. In the formation of the granite the two minerals mica and felspar were the first to crystallize, impressing their form upon the semi-molten or semi-fluid quartz, which solidifying last, wrapt up within itself large quantities of the highly-heated water in the form of minute liquid parcels or cavities. Subsequently, on cooling of the mass, removal of pressure, or both, the water would cool, but being closely sealed up in glassy (quartz) cavities or minute bottles, it could not escape in the state of vapour any more than at the first, but in its cooled condition would occupy a slightly less space, in other words, the contraction would leave a minute bubble or empty space (called for convenience' sake, a *vacuity*), which vacuity you will see must have a size proportionate, first, to the size of the liquid parcel; second, to the heat and pressure under which the fluid was originally confined. Hence, if it is found that in a number of cases the *relative* size of vacuities and liquid-cavities is the same, these relative dimensions give us clue to the amount of combined heat and pressure under which the granite (or, to speak more accurately,

the quartz of the granite) was formed. Here, then, is an interesting problem; but at the outset it appears that to find out the exact amount of either the heat or the pressure, it is necessary to know that of one of these elements; thus, if we knew the pressure and observed the relative size of vacuity (or bubble) to liquid-cavity, we should have the two elements from which to calculate the *heat*; or, if we could form a tolerably accurate estimate of the heat, and made observations on the relative size of vacuity and liquid-cavity, these elements would allow us to form some fairly correct idea of the *pressure* under which the rock was formed.

Now, by an elaborate series of investigations, Mr. Sorby has shown it to be very probable that the heat was not much greater than 360° C. (680° Fah.), or not more than a dull red heat visible in the dark. We have already seen how the water in many cases contained, when hot, more mineral salts dissolved in it than could be so contained when cold; hence the small crystals of salt sometimes found in the liquid-cavities; but Sorby has also called attention to the fact, that crystals of the mineral called Schorl (a variety of hornblende) are frequently enclosed in the liquid-cavities, and that these would be fused at any temperature greater than a dull red heat; and from this and other facts he has fixed on the temperature of 360° C. (680° F.) as the probable extreme at which the quartz of granites was formed. Calculating on the basis of these elements, and having made a large number of observations upon the relative size of the vacuities and liquid-cavities in the quartz of the Cornish granites, Mr. Sorby arrived at the conclusion that the mean of the pressure expressed in feet of rock under which the Cornish granites were consolidated was 50,000 ft. (this not necessarily the actual depth at which formed).

(To be continued.)

THE CRITICAL BOTANIST.

THE educational value of "natural" or biological science, as distinguished from "physical" or "experimental" study, depends on the stress laid, not only on mere observation, but on observation at once careful and minute. Experiment is being introduced with much good result into the biological sciences. It teaches handiness or skilful manipulation, and exactitude in recording results. The use of quantitative analyses and statistics has also a great value, not only to science, but also to education. Still, critical observation is the chief educational *raison d'être* of biology, and especially of botany, to the tyro. In proportion as it is careful and minute, will this observation be valuable to the observer. Its value to science is really a secondary matter, and will come unexpectedly, being dependent, not only on care and minuteness, but also on what may be termed "rationality." By this, I

mean a direction of observation into channels of importance, channels not filled by work already done. This "rationality" will come to the tyro who both studies and observes.

As I know that the unbotanical and junior students are entirely ignorant of what "critical botany" means, and as science sadly needs more critical observers, I thought SCIENCE-GOSSIP would be the best medium for a few notes on the subject.

Criticalness is necessary in all branches of the science. In the chemistry of plant-life, it is not enough to know that certain elements occur in certain plants. We want to know in what proportions they occur, in what manner of composition, at what periods of the life of a plant, and in what organs or tissues. We want to know where the plant gets them, how it assimilates them, what changes they undergo in the plant, and whether they are essential to its life. This amounts to a want—very partially supplied at present—of detailed chemical analysis of various tissues and organs of many different species at various stages of growth and decay, and an extended practice of the valuable experiments in "water-culture," the growth of various plants in definite solutions.

In general Morphology or Minute Anatomy, we must not rest content with knowing that such and such a member is built up of such and such tissues, or that these latter are composed of various laminae of cells or vessels of different shape or structure. We want also to see the mode of development of each cell, how they make up the vessels and tissues, and how the complex member arrives at its complexity. Not only is there room for additional research on the functions and behaviour of the nucleus of cells and for further elucidation of the history of starch, but the subject of the crystalloid granules, the aleurone particles, and the "raphides," or true crystals, contained in the cells of many plants, is a mine but slightly worked. Systems of branching and phyllotaxis are also lines—among many I might mention—in which there is yet much to be done by accurate observation, especially that of development.

In elementary Physiology, science stands in need of help, rather from experiment and statistics than from pure observation; such as the experiments of Professor McNab on the movement of water in plants (*Trans. Roy. Irish Acad.*, vol. xxv.), those of Sachs on the corroding power of roots, and of Mr. Darwin on twining plants.

In special Morphology and Physiology, however, there is an inexhaustible field for new and valuable observation. The life-history of the lowest plants, as studied by Messrs. Dallinger and Drysdale; the hybridization of ferns and flowering plants, both in cultivation and in a wild state; the homology of certain special organs, in various groups, worked out, as Mr. S. H. Vines has done that of the suspensor (*Quart. Journ. Micros. Sci.*, Jan., 1878); the minute anatomy of the leaf as a classificatory cha-

acter, as Professor McNab is proving it among the Conifers; the floral development and teratology, or abnormal forms, of various groups, studied on the method inaugurated in Payer's *Organogénie de la Fleur*, excellent examples of which may be seen in Dr. Masters's paper on Primula, just issued, in the *Transactions of the Linnean Society*, in his note on the Compositae, in the *Journal of Botany* for February, and in Mr. Hartog's paper on the Sapotaceæ, in the same journal for March: these are a few of the wider subjects for critical study. Here it will be seen that it is often necessary that observations should be both numerous and even continuous, and that they should be compared one with another.

But even in the simpler and isolated observations of the collector and tyro, the critical faculty comes equally into play. I call it a faculty, for, like the imagination of the poet, some people seem to be utterly destitute of it; but I have little doubt that this arises, mainly, from its never having been cultivated, educed, educated. If you have a garden, and are likely to remain in one locality for years, you may render much service to botanical science by observing the exact date of the opening of leaf-buds and flower-buds in various species in each year, noticing also the altitude above sea-level, latitude and soil of your garden; and, if possible, other meteorological details, such as rainfall, thermometric and barometric observations, wind, &c. If you can name, or capture and get named, the various insects which feed upon your plants, or which visit their flowers, distinguishing those that suck the honey, those that eat and those that carry away the pollen, you will also be doing good scientific work.

If you collect wild plants, it is important to notice the altitude at which a species occurs, the nature of the soil it grows in, and its exact topographical position, so that it can be seen, not only in what county and parish it occurs, but also in what river-basin; since the vast importance of river-basins in the distribution of plants is now generally acknowledged.

Lastly, it is important to note exactly what your find is. This is what English botanists generally speak of as critical knowledge. You must make yourself sure, not only of genus and species, but in many cases of sub-species, variety, or variation. To do this is time well spent. It makes you examine a plant more closely than if you already knew it well, were told its name or identified it, as some tyros do, from its general resemblance to a picture.

By this close examination you unconsciously gain a far deeper and more permanent knowledge of a plant than by being told its name; and, moreover, your accurately determined locality for one of these "segregates," as they are termed, may be of great use in the generalizations of botanical geography. Independently, therefore, of any theory as to the origin of species, it is far better, from the point of view of self-education and instruction, to be a

"splitter" than a "lumper." For books, then, the student cannot have a better general manual of British Botany than Professor Babington's. For many groups, however, he will do well to use special monographs; and it must also be clearly understood that varieties are hardly to be recognized by mere "book-characters," but must be studied in the living state.

In conclusion let me take as an example the first group which requires critical study in the first of the natural orders, viz., the genus *Thalictrum* (Meadow-rue), among the Ranunculaceæ. Whilst the order Ranunculaceæ, which contains some thirty genera and some five hundred species, is almost universally distributed, but is especially abundant in temperate and cold regions, the genus *Thalictrum* is confined to the northern hemisphere. Like the order to which it belongs, this genus is essentially European, occurring comparatively rarely in North America, North Africa, and Asia, in which continent it is only known in the north and west, to the Himalayas. The order is what is termed a very "natural" one, being, in spite of many anomalous genera, clearly defined and separated from its nearest allies. It is also readily and naturally divisible into the five tribes, originally framed by De Candolle; viz., Clematideæ, Anemoneæ, Ranunculeæ, Helleboreæ, and Pæoniæ. The last two of these agree in having the fruit "dehiscent," i.e. splitting when ripe, and all except Clematideæ have the sepals overlapping, or "imbricate." Anemoneæ and Ranunculeæ differ in having the single ovule in each "achene," or indehiscent carpel or fruitlet, pendulous in the former, ascending in the latter. The genus *Thalictrum*, along with *Anemone*, *Knowltonia*, *Adonis*, *Callianthemum*, and *Myosurus*, constitute the tribe Anemoneæ. *Knowltonia* curiously occurs in South Africa, and *Myosurus* in Europe, Asia, Africa, Australia, and New Zealand. *Thalictrum* and *Anemone* differ from the other genera of the tribe in having no petals, and *Thalictrum* is distinguished from *Anemone* by the absence of the involucre of three leaf-like bracts characteristic of the flower-stalk of the latter. The Meadow-rues are herbs with a perennial rootstock and erect habit; leaves bi- or tri-pinnatisect and stipulate; inflorescence panicled or in a raceme, without any involucre, often polygamous; sepals four or five, imbricate, petaloid, and dull green, yellow, purple, or whitish in colour, usually small; petals absent; stamens numerous; carpels on a narrow receptacle, with short styles, which are persistent or deciduous, and with one pendulous ovule in each, afterwards forming a fruit of achenes, which are often stalked, and are variously ribbed, nerved, or winged. There are about fifty species, some three to six of which only, accordingly as one "lumps" with Hooker or "splits" with Babington, are British.

G. S. BOULGER.

(To be continued.)

NATURAL HISTORY IN THE SEVENTEENTH CENTURY.

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

PART II.

THE ignorance of natural history displayed in the description of animals living in distant lands, may be excused on the ground of the difficulty of obtaining any accurate knowledge of their habits, or even form, from those who had seen them in their native wilds. The principal authorities were sailors, who, with that love of the marvellous usually accompanying ignorance, allowed their imaginations to run riot in describing the animals or plants of foreign countries.

This excuse will not, however, apply to the author's descriptions of our domestic animals, as the following extracts from the chapter on dogs will show:—

"OF THE DOGGE

IN GENERALL.

"A Dogge is called in hebrew *Keleb*, and *Lamas* according to *Munster*, in Caldee *Kalba*, in Arabique *Kalbe*, in Persia *Sag*; the Saracens *Kep* or *Kolph*; the Græcians *Knon*, because of his love to man, and vulgarly at this day *Skilos* and *Skirle*; the Medians *Spaco*, the Germans *Hund*, the Italians *Cane*, the French *Chien*, the Spaniards *Perro* or *cavendo*, because his barking is as loud as an Artificial song; also *Catellus*; the Illyrians *Pes* or *Pas*, and the Latins *Canis*.

"There is no region or countrey in the world where these are not bred in some store, as shall be declared afterwarde, in the particular discourse of every kind of Dogges. For as shall be manifested more at large, there are Dogges very great, some for hunting, some for Warre and defence, some for the Bull or Bear, some for the Hare, Cony, or Hedgehog; againe, some are smaller, which are called Hounds, Braches,* Beagles, Shepherdes Dogges, House-curses, Spagnels, both for Water and Land; and some foysting Dogges,† for the pleasure of the rich.

"In the first-place there are to be handled the nature of Dogges in generall, wherein they agree, and their common properties of nature, such as are not destroyed in the destinction of kinds, but remaine like infallible and invariable truths in every kinde and countrey in the world. . . . The outward proportion of the head altereth as the kind altereth, being sometime like a Lyon, sometime like a Hedgehog; some long with a broad snout, and some with

* These dogs are supposed to be dogs of scent. No very definite meaning seems to have been attached to the name by early English writers. The word is apparently synonymous with the old French word *Bräche* (German *Brack*), translated *chien*. Shakespeare seems to have considered them as pet dogs. "Truth's a dog that must to kennel when Lady the brach may stand by the fire and stink."—*Lear*.

† Lapdogs; see fysting, in Nares' Glossary.

a piked snout; but the braine decreaseth and increaseth with the moon. There is no commissure or seame in his skull (like as in a mans), but it is a continued bone without separation inw^{ard} or outw^{ard}.*

“The louder and shriller voice of a Dogge is called barking, the lower and stiller is called whining or fawning. It was a monstrous thing that a Dogge should speake and a serpent barke, as it is beleeved in antiquity both came to passe, when *Tarquinus* was driuen out of his kingdom. It is not causelesse that the barking of Dogges hath attributed unto

holy actions, and so ought the eies and ears of a Prophet be attendant upon heavenly things. The *spleene* because a Dog hath little or no spleene, and therof commeth his madnes and death whereof also it commeth that the seruants which have charge of Dogges being with them in their sickness and latter end for the most part prove splenaticke. Smelling, neezing, and Laughing, because the spleenatike can do more of all these, but of this more afterward.”

The Rev. Topsell concludes his account of the Village Dogge or Housekeeper by relating the fol-

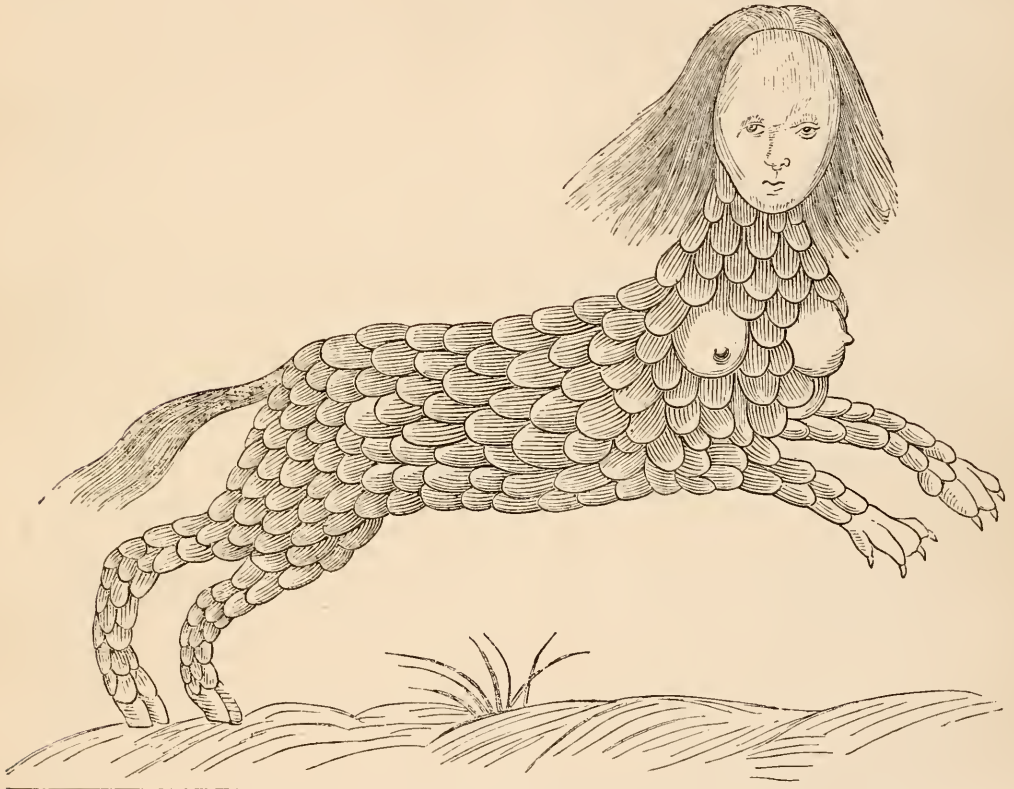


Fig. 201. The Lama.

it divers qualities, as for a man to dreame of the same presageth some treasonable harme by enemies, so likewise if they fawne and claw vpon a man.

“The Egyptians signifie three things by a Dog, a *Scribe*, a *Prophet*, a *spleene*, *smelling*, *laughing*, *neezing*. A Scribe because a Dog is silent more than he barketh, so must a perfect scribe meditate more than he speaketh, for to barke at euery one were to pleasure none, and to speake continually were a signe of madnes. Again, a Prophet because a Dogge doth most eagerly behold and admire constantly all

* If the writer had taken the trouble to examine a skull, he would have found that cranial sutures were present.

lowing anecdote, the truth of which is vouched for by *Antonius Schnebergerus*, an authority with whom I regret to say I am unacquainted.

“In a Church in Cracouia, dedicated to the *Virgin Mary*, wherein euery night are an assembly of dogs which unto this day (saith the Author) meete voluntarily at an appointed houre for the custody of the Temple and those ornaments which are preserved therein against theifes and robbers, and if it fortune any of the dog Dogges be negligent and slacke at the houre aforesaide, then will he bark about the Church until he be let in, but his fellows take punishment of him and fall on him, biting and rending his

skinne, yea sometimes killing him ; and these Dogs haue a set dyet or allowance of dinner from the Canons and Preachers of the Church, which they duely observe without breach of order, for to day two of them will goe to one Cannons house and two to anothers, and so likewise al the residue in turnes successively visit the severall houses within the cloyster yard, neuer going twice together to one house nor preuenting the refection of their fellowes ; and the story is reported by *Antonius Schnebergerus* for certain truth upon hia own knowledge."

He concludes his own history of dogs with a description and anecdotes of the little Melitæan Dog, of whose intelligence he relates some remarkable instances of instinct, far surpassing anything in "Jesse." One kept by a certain Italian, about 1403, called Andrew, is perhaps the most remarkable. The dog, although blind, "would find, even when buried in the earth, Rings, Jewels, bracelets, pieces of gold and silver, lent to his master by the standers by, and when he was commanded, give to every one his own King, Jewell, Bracelet, or money, which the blind dog did without stay or doubt. Afterward the standers by gave vnto him diuers peeces of coine stamped with the images of sundry princes, and then one called for a piece of English money, and the Dog deliuered him a peece ; another for the Emperors coine, and the Dog deliuered him a piece thereof: and so consequently every princes coine by name till all was restored, and this story was recorded by *Abbas Vrspergensis*, whereupon the common people said the dog was a diuell, or else possessed with some pythonicall spirit : and so much for this dog.

"Now a daies they have found another breede of little dogs in all nations beside the Melitæan Dogs, either made so by art, as enclosing their bodies in the earth when they are whelpes, so as they cannot grow great, by reason of the place or els impaying their growth by some kind of meat or nourishment.

"The Dogges of *Casamania* can neuer be tamed, for their men also are wilde, and liue without al law and ciuility, and thus much of Dogs in special.

"In the next place I thought good to insert into this story the treatise of English Dogs, first of all written in Latine by that famous Doctour in Phisicke, *John Cay*, and once translated by A. F., and directed to that noble *Gesner*."

This treatise is written in the form of a letter, which he commences thus. "I wrote vnto you (well beloued friend *Gesner*), not many years past, a manifolde history containing the diuers forms of Beast, Birds, and Fishes, the sundry shapes of plants, and the fashions of Hearbes, &c.

"I wrote moreouer vnto you seuerally a certain abridgement of dogs which in your discourse vpon the formes of Beasts in the second order of wilde and tamable beasts wher you make mention of Scottish Dogs, and in the winding up of your letter written and

directed to Doctour *Turner* comprehending a Catalogue or rehearsal of your books not yet extant, you promised to set forth in print, and openly to publish in the face of the world among such your workes as are not yet come abroad to light and sight. But because certain circumstances were wanting in my breuiary of English Dogs (as scemed vnto me), I staid the publication of the same making promise to send another abroad which might be committed to the hands, the eies, the minds, and the iudgements of the Readers."

(To be continued.)

A FEW AUTUMN FLOWERS, WITH HINTS UPON THEIR CULTURE.

BY MRS. BATTERSBY.

A GROUP of autumn flowers—not geraniums, or heliotropes, or calceolarias, though they are very brilliant and lovely for those who can afford greenhouses and forcing-pits, and the amount of care, time, and trouble which will tide these delicate favourites safely over a winter's frost and snow—but a bouquet of out-of-door plants which may be left in the garden season after season, gathering strength and beauty, and lighting up our autumnal *parterre* with their vivid tints.

One of our chief favourites is the Fuchsia. It is quite wonderful to find what numberless varieties of these beautiful shrubs will survive our winters. As a proof, I must tell you I once struck three cuttings of the then rare double white fuchsia ; upon the approach of frost two were safely housed—the other, much to my annoyance, could not be found. Next summer my housed plants were healthy, but rather stunted both in leaf and flower ; while the missing one, which had died down to the ground in winter, threw up long luxuriant shoots, and blossoms which looked like small white roses enclosed in rich crimson sepals. The sole protection which the young plants had enjoyed was a light surface-dressing of turf-mould ;—and cocoa-nut fibre, coal-ashes, or moss would probably have answered quite as well. Fuchsias are very easily managed ; the chief secrets are a rich, light soil, and a sheltered, yet sunny aspect. They enjoy the protection of a wall, and blossom particularly well when planted against one ; and the sole drawback to the out-of-door culture of fuchsias is, that in late seasons their best flowers are generally "caught" some frosty night, and present a melancholy spectacle on the following day.

Next to my fuchsias I would place a real autumn gem, the tall, white anemone (*Japonica*), which, rising from a cluster of rather coarse but handsomely-shaped leaves, on a stem of more than three feet in height, bears a number of snowy blossoms singularly alike, both in shape and size, to the white wild-rose of our hedges ; but though we miss the fragrance of the way-

side flower, our anemone has the charm of preserving its beauty in a vase for nearly double the time of the much-prized rose; indeed, with the exception of china-asters, pyrethems, and chrysanthemums, anemones might claim a prize for this property. *Anemone Japonica* is perfectly hardy, and easily cultivated, as the roots can be separated in early spring without injury to the plant; but a row of white anemones left undisturbed in front of a garden-hedge becomes one of the prettiest sights in an autumn garden—the masses of snowy petals are brought into such bold relief by their green background. For scarlet to place against our white blossoms perhaps *Lobelia cardinalis* can hardly be surpassed; except perhaps by some late blossom of gladiolus. But the lobelia is rather a capricious plant; it requires a large amount of moisture in a thoroughly well-drained situation. The most successful bed I have ever seen was made by removing about two feet of the upper soil, and placing a quantity (about half a foot) of broken bricks in the pit. The soil was then replaced, and the lobelias grew and flourished for years. Unfortunately they were removed to an adjacent bed without drainage precautions being taken, and they “damped off,” or sent up sickly stunted shoots as long as they survived. A clergyman, for many years resident in America, told me the beauty and brilliancy of a swamp of lobelias in their native habitats is almost dazzling.

There is a rather pretty violet-coloured and also a lilac lobelia, both of which blossom in autumn; but even the scarlet of the lobelia pales beside the blossoms of the “velvet” *Salvia*, and its sister, the blue salvia, is not surpassed by any autumnal flower. The length of time this plant remains in blossom, if not destroyed by rains or high winds, is marvellous. First the “king spike,” and then the side spikelets, seem never weary of showing their brilliant colouring to grace our autumn bouquet; and after a trial of six seasons out of doors, merely protected by a covering of turf mould, my noble plant is the admiration of all visitors. Sometimes in spring the early shoots of both salvias are cut off by frosts, but the hardy plant, like the field potato, only waits for a few congenial days to send up a succession of fresh sprouts from its uninjured tuberous roots. Blue salvias are easily reared from seed (if these are defended from robins, which seem particularly fond of them); they will also root from small side-shoots, or slips, in summer; but until the tubers form they should not be left out in winter time; and when the plants are meant to remain out of doors they should be planted in spring and left undisturbed during the summer, so that they can “settle themselves,” as our old gardener used to call it, before winter.

And now for yellow to set off my scarlet, white, and blue favourites. I shall either take a few blossoms of *Viola lutea*, or twigs of Spanish broom;

both are perfectly hardy. Though I shall not place purple beside blue, I may remark, *en passant*, that a bed of *Viola cornuta* of that lovely shade is at present one of the most brilliant spots in the garden, whilst its yellow sisters form glowing borders to several other beds, and they have now (October) been in blossom for the last three months. A box of slips taken from young shoots of violas (close to the ground), and stuck between the old cut-down plants in spring each season, will give a beautiful succession of flowers all through the summer months; and entomologists may care to know that the *Viola cornuta* and all its purple varieties are veritable moth-traps on summer evenings. The Spanish broom is a beautiful shrub in autumn, with one defect,—that it blossoms so late in the season that it is difficult to procure ripened seed.

And now I must look for some pretty leaves wherewith to form a background for my bouquet, and I shall find them in the delicate fern-like green of a bed of young carrots; they are so light as to prove invaluable at this time of year for arranging vases, and we may often find a leaf almost as scarlet as the lobelia beside it. One shade more and our group will be complete,—something dark,—and our children supply it. They have been out boating, and have brought home a bunch of “giant black-tufted grass,” as they call it, a plume of which will make our autumnal vase of flowers quite artistic in effect.

FOSSIL POLYZOA.

THE GENUS FENESTELLA: ITS HISTORY, DEVELOPMENT, AND RANGE IN SPACE AND TIME.

BY GEORGE ROBERT VINE.

I.—History of the Genus.

SOME of the most prolific forms of animal life found in the palæozoic series of rocks are a group of Polyzoa, which has passed under several names. By the earliest investigators, some of these Polyzoa were classified with the corals, and were consequently placed by Goldfuss with the genus *Gorgonia*.* Other forms were restricted by the same author, and placed with Lamarck's genus *Retepora*. This was the status of classificatory knowledge when Phillips wrote his work on the “Geology of Yorkshire.” Turning to one of the later editions of Brown's “Zoologist's Text-book,” published by Fullarton, in 1833, I find the class Polyypi placed among the Radiata, in the fourth division of the Animal Kingdom. The animals of this class were gelatinous, with elongated contractile bodies; and provided with an alimentary sac, which had one opening; mouth terminal, surrounded by radiated tentacula; the greater number of the species con-

* Linnæus.

gregated, adherent, and forming compound animals.* The class was divided into five orders; but under one order, those of *Polypti vaginati*, *Spongia*, *Coralina*, *Gorgonia*, and *Retepora* found a home. With these were associated many of the corals, polyzoa, and anthozoa, which have been separated by later investigators, and placed under classifications altogether different from either that of Brown or Cuvier.

The generic character of Lamarck's *Retepora* is as follows: Stony, and interiorly porous, with thin, depressed, branched expansions, sometimes free, at others formed like net-work; the polypiferous cells on one side only, at the upper or internal surface of

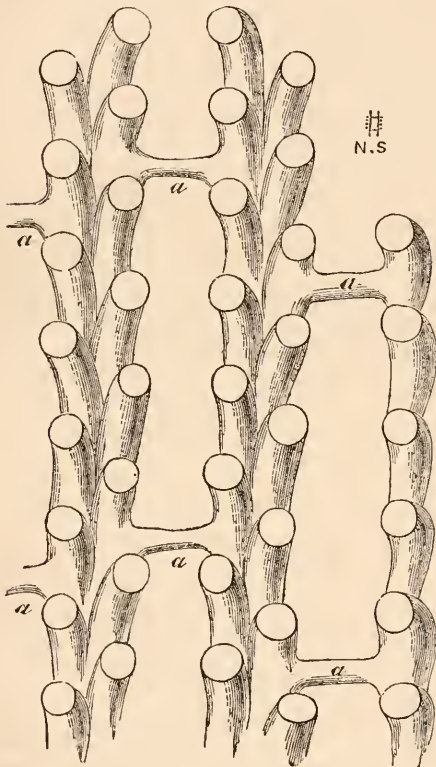


Fig. 202. *Fenestella plebeia* (McCoy), Hairmyres (Scot). Showing the growth of the dissepiments (*d*) from the Zooecia; sometimes from the base, at other times from just below the orifice of the cell. Natural size: about $\frac{1}{4}$ th of an inch to two fenestrules. *Diastopora megastoma* was parasitic upon this. (Transparent.)

the mass; and Brown gives as a type of the genus—*Retepora cellulosa*, with this restricted specific character:—Flattened, thin, greatly undulated, with elliptical cells; inhabits the Indian Ocean. With this before them, I can easily understand how difficult would be the labours of the earlier palaeontologists. Both Goldfuss's and Phillips's Carboniferous, Devonian,

and Silurian Polyzoa had to be classified as they were, or remain unclassified, and consequently undescribed. The few fossils at their disposal forced them to be particular with the minute specimens in their possession, and the diagnosis of their species suffered in consequence of their poverty.

From the time when Phillips wrote his "Geology of Yorkshire," till the time of William Lonsdale, the founder of the "Devonian System" in geology, very little labour was bestowed upon the Palaeozoic Polyzoa. Like the rest of the investigators, he was inclined to place the *Fenestella* with the *Retepora*; but previous to the publication of Phillips's "Palaeozoic Fossils of Cornwall, Devon, and West Somersetshire," Mr. Miller, of Bristol, in correspondence with Phillips on Fossil *Zoophyta*, suggested that a new genus should be constituted for some of the reticulated corals allied to *Retepora* in the Carboniferous

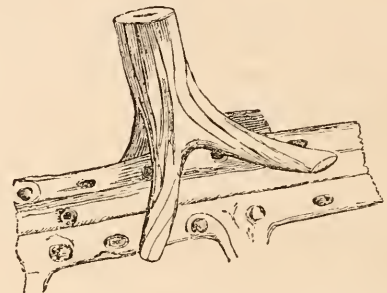


Fig. 203. Branch of *Fenestella* with "organisms" like *Palaecoryne* "parasitically" attached.



Fig. 204. This sketch of the fig of *F. banyana* was in all probability a recumbent form. The figure represents a cavity in the limestone, and shows the processes extending from the front.—Mr. John Young, F.G.S. Fig. 4; plate 18, "Transactions of the Acad. Sci. St. Louis," vol. i. p. 450.

limestone. On mentioning this to Mr. Lonsdale, he at once adopted the suggestion, and named a species of the Silurian strata *Fenestella Milleri* (Lonsd.).* In 1841 Phillips himself adopted this term.

This more expressive generic term has since been adopted by nearly all writers on Palaeozoic Polyzoa; and Lonsdale gave as a description of the genus, characters altogether different from *Retepora*, and more in accordance with known facts. It is impossible for me to give the exact description as given by

* Phillips's "Palaeozoic Fossils of Cornwall, &c." Through the kindness of Mr. Plant, curator and librarian of the Peel Park Museum, Manchester, I have been allowed to extract whatever I required, and trace the original figures of specimens from this rare volume.

* Brown's "Zoologist's Text-book."

Lonsdale—not having his works at hand to refer to—but the following is taken from M'Coy's "Palæozoic Fossils":—"Polypidom calcareous, cellular, forming a conical or fan-shape expansion of radiating branches, interstices connected by transverse dissepiments; exterior surface of branches rounded, covered by dense minutely porous layers; inner surface with a keel along the middle, separating two rows of mouths of short tubular cells, which extend a variable length obliquely downwards and inwards into the interior of the branch: dissepiments usually without cells, occasionally a row of small cells on the mesial keel. Non-celluliferous side formed internally of a layer of vertical capillary tubes." This genus was placed by M'Coy among his Family, Group MYRIAPORIDÆ, a

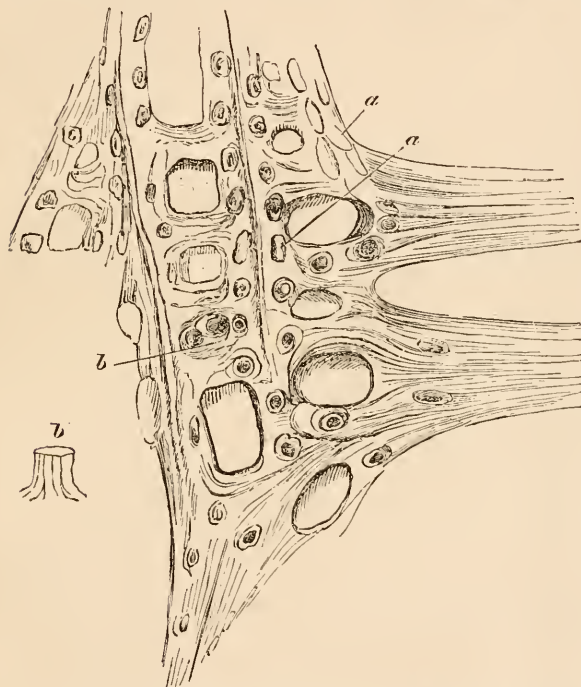


Fig. 205. *Fenestella* with lateral *Palæocoryne*. *a*. Bases of cells partially exposed. *b*. Immature development of Fenestrule with *Palæocoryne* (*b*) on reverse. The wider openings are the fenestrules, very irregular in shape and size. The specimen is upside down, to show the connection on the branches. (Natural size, slightly over $\frac{1}{8}$ of an inch.)

group which embraced the genus *Retepora* of Lamarck; the *Elasmopora* of King; the *Glaucanome* of Goldfuss restricted by Lonsdale; the *Penniretopora* of Prodomas; the *Acanthocladia* of King; together with the sub-genera *Fenestellina* and *Reteporina* of D'Orbigny.

The first recorded appearance of this genus is in the Bala beds of the Lower Silurian series. In Morris's Catalogue, and also in Jukes's "Student's Manual," 1857, it is recorded as appearing in the Upper Silurian, in company with many other forms of Polyzoa. In the later edition of the Manual this

may have been corrected, but I have not seen it. But in Morris's earlier Catalogue, which he began in the 1st volume of the *Geologist*, *Fenestella subantiqua*, D'Orb., and *F. Milleri*, Lonsdale, are given with the Lingula, Llandello, and Caradoc or Bala Bed fossils.

From either the figures or even the specimens, it is very difficult to make out the true character of *F. Milleri*. The habit of the species as impressed upon the Bala shale is peculiar and characteristic. It is partially flabelliform, but not universally so, as some of the branches cross and recross the under ones; thus obliterating the true character. The interstices are thin, and according to the description, the dissepiments are narrow and slender, and two lines apart. The fenestrules are five or six times longer than wide,

with about twelve pores to the fenestrules.

If this be a true description of the species, *F. Milleri* is a marvellous specimen of the earlier *Fenestella* group. *Fenestella Lonsdalei*, D'Orb., is figured in *Siluria*, and is given by Morris in the earliest, as in the latter catalogue.

It is found in the Dudley limestone as well as in the lower beds, and if the synonyms be true, the species had a very wide range, as it is figured as an American species as *F. prisca*, and Morris, in his catalogue, gives *F. prisca* as a synonym of the species.

The figure before me is cup-shape, attached by a broad base to some foreign object. The outline of the margin of the cup-like form is entire, and the poriferous face will be on the inside, like modern species of *Retepora* and *Hornera*.

It seems to be a good species, and habit alone would be a sufficient character. *F. subantiqua*, D'Orb., is another Silurian *Fenestella*; but among synonyms of this are given *F. antiqua*, Lonsdale, *Retepora antiqua*, Goldfuss, and *R. membranacea*, Phillips: it may be a fragment of some larger specimen of *F. prisca*.

D'Orbigny's species, as recorded and described in his Palæozoic Fossils, has a corallum very slender, with straight interstices, seven or eight of these measuring only two lines; the dissepiments are thick, and the fenestrules are rectangular or

oblomg, about three lines longer than wide. The pores are small, thick, with prominent edges, their own diameter apart, and six or seven to the length of the fenestrules. *F. reticulata*, Lonsdale, is a species that has been often confounded with Hisinger's *Retepora*, so much so, that M'Coy draws attention to the fact, acknowledging that it is scarcely possible to determine the specific character, as no information is given relative to the pores. Yet, as his species of *Retepora Hisingeri*? agrees in some particulars with the original, he would even add confusion to the confusion, and name it *R. retiformis*, even though Mr.

Lonsdale had applied the term to "a very similar corallum, which he, however, places with the genus *Fenestella*, and figures with only the two rows of pores usual in that genus."

F. patula, M'Coy, and *F. rigidula*, M'Coy, are good forms and very well described. The corallum of *F. patula* is small and semicircular, about half an inch in diameter. The interstices are broad, strongly carinate, slightly flexuous; the dissepiments are strong, and the fenestrules are a little wider than the interstices; the pores are large and prominent, about 3 or 4 to length of fenestrule. Its general features and character are very much like some of the smaller species of the Carboniferous limestone. The figure of *F. rigidula* is peculiar and striking, and it much resembles some of the Devonian species of Nicholson.

The following, however, is M'Coy's note on the synonyms of the several species:—

"*Fenestella antiqua*, Lonsdale = *F. subantiqua*, D'Orb.

F. antiqua, Goldfuss, is a distinct Devonian form.

F. prisca, Goldfuss, Silurian = *F. rigidula*, M'Coy.

F. elegans, Hall, Silurian = *F. rigidula*, M'Coy.

F. assimilis, Lonsdale, Silurian."

My list contains the names of three other forms. Dawson describes one by the name *F. Lyelli*, and Hall figures and describes two other species from the Clinton series of America,—*F. cribrosa* and *F. tenuiceps*. There are figures of these species, I believe, in Dana's Manual.

I could not pretend to give anything like exactness to my review of the Silurian species of *Fenestella*. To say that the whole of the descriptions are very foggy, would be perhaps vulgar denunciation, but it would be nevertheless a fact. And before altering my formerly written paragraph, which was less sweeping than this, I have gone over again the whole of M'Coy's figures and descriptions. These are good so far as they go, but they do not come up to a proper analysis of the specific characters of the genus which modern biological, or even palæontological studies demand. Too much dependence has been placed upon the isolated fragments, which give only a partial view of the true ideal of specific type. In reviewing the Carboniferous *Fenestella* I shall be able to make this more clear.

Attercliffe, Sheffield.

(To be continued.)

[I should be glad to correspond with any student who has described or undescribed species of *Fenestella* in his cabinet, for the purpose of more accurate identification.]

COTONEASTER VULGARIS.—Could I ascertain whether this plant still exists on Great Orme's Head? The habitat I have down for it is, on rocks above the copper-mines. Along with two friends I worked the locality well, without avail, last month: probably it has got exterminated.—H. T. G.

HOLIDAY RAMBLES IN ST. OUVEN'S BAY—

"SHALL it be Scotland or Jersey?" was the question put when arranging for a botanical tour; and though the flora of Clova, Glen Isla, Braemar, and the Grampians is sufficient in itself to make a holiday enjoyable, but when the additional advantages of lovely scenery and health-giving mountain breezes are added, it must indeed be a rich and peculiar flora to outweigh them; but possibly it was the long monotonous spring, with its absence of sun, that caused the Channel Islands to exert a spell so magnetic that not even the presence of the "silvery streak" was sufficient to break or neutralize its influence. So, having prepared for work by spending a day among the oaks of Whittlebury Forest, whose natural history has yet to be written, and glorying in another at Kew, we proceeded with considerable misgivings to cross from Southampton by a passage whose horrors had been sufficiently dwelt upon by candid friends; but, thanks to the soporific effect of the daily literature we had assimilated, we slept a dreamless sleep as we passed through the Solent and the chops of the Channel. Arriving at St. Helier's, in Jersey, we noticed the slopes of Fort Regent were brilliant with *Medicago maculata*, *Silene Anglica*, *Linum angustifolium*, *Tragopogon porrifolius*, *Sedum Anglicum*, and two or three specimens of *Gladiolus*, which had established themselves there. But it would be wearisome to give in detail the various plants seen on the different days spent in Jersey; sufficient to say, that, having beautiful weather we visited the rocky Corbières, home of the seabirds, enjoyed the delightful breezes on the samphire-covered cliffs of Pleinmont, the only Jersey locality for *A. capillus veneris*, admired the ivy-covered castle of Mont Orgueil, the shady lanes of St. Saviour's, home of *Arum italicum* and *Sibthorpia*, and had taken the rather noisy coach-rides by Beaulieu Bay, with its view of sunny France, and the romantic gardens of Rozel, not to speak of the sea-bathing, which the firm sands and clear water render so pleasant, and the entomological hunts after *Thecla rubi*, *Cinxia*, *Edusa*, *Cardui*, and *Daphidice*, on the hot slopes of Noirmont Point and Greve de Lecq; while the enormous cow-cabbages, the fig-trees, and extensive vineries had been properly inspected. So, in order to give some idea of the peculiarly rich and extensive flora of Jersey, one day shall be used as a sample, comprising, as it did, some of the best and most typical plants. Its route may be shortly given as follows: from St. Helier's to Beaumont, thence to St. Ouen's on to L'Étac, returning by St. Ouen's Bay to La Moye and St. Bre-lade's. The distance walked would be from 24 to 26 miles. The success of the day was owing to the company of Mr. Piquet, who is compiling a new flora of Jersey, and the previous reading up of Babington's "Flora Samicæ." Shortly after leaving the nautical-looking station of St. Helier's, the rail, which

runs round St. Aubyn's Bay, was bordered with *Borago* and *Anchusa sempervirens*, common viatical plants in Jersey, followed by great quantities of *Cenothera odorata*. Dismounting at Beaumont, and walking to Bel Royal we found *Alyssum maritimum*, and then visited St. Peter's Marsh, where *Ranunculus ophioglossifolius*, *Cyperus fuscus*, and *Isnardia palustris*, formerly grew, but with the drainage of the marsh and its subsequent cultivation these rarities have disappeared. Mr. Piquet, however, pointed out the exact spot where he had last gathered the *Ranunculus*. At Bel Royal, in Professor Babington's locality, we gathered *Herniaria subciliata*, growing in straggling dark green patches, not unlike *Thymus Serpyllum*. Near it we also found *Allium spherocepalum* and *vineale*, *Silene conica*, whose prettiness is lost by drying, and *Cenothera* in great plenty. Passing through one of the shady lanes we gathered *Scrophularia Scarodonia*, which takes the place of our *nodosa* and *aquatica*, the two latter being rare in Jersey. On emerging into the bright sunlight we noticed the pretty *Lotus hispidus* and *Sedum Anglicum*, while the gardens of the nice little villas were blazing with *Mesembryanthemum* and *Gazonia*. Nearing St. Peter's, on a shady wall we came upon the Jersey Fern, *Gymnogramma tentophylla*, in abundant fruit, but losing its colour, May being the month for it in perfection. On the way to St. Ouen's Manor, about Vinchelez, where we had previously caught a fine specimen of the Jersey Lizard, *Lacerta viridis*, before it threw off its tail, as did another we caught near St. Brelade's. In these oak-shaded lanes entomologists possibly would have been pleased by the strong odour emitted from hundreds of the goat caterpillars which infect and destroy many of the trees about here; but to us the smell of *Allium triquetrum* that haunted our vasculi was deemed preferable. Gratefully accepting the invitation to visit the Manor House, we went over one of the ancient homes of Jersey,—the ancestral seat of the Carterets; and had we been archaeologists, we might have reported upon the quaint oak carvings and mullioned gables; but being only botanists, we most enjoyed the view over the island, down the well-wooded valley to the coast of St. Ouen's wide-stretching bay, and the pond, dear to botanists, the *ultima Thule* of our journey: while, above us, the grand old chimneys, covered with white and pink snapdragons, and the thatch-roofed outhouses, covered with such profusion of *Cotyledon*, surpassing any previously noticed,—not excepting Pandy Mill, delight of artists, the rocky lanes of Carmarthen, or the peat-topped walls of county Mayo. Leaving St. Ouen's we came upon a marshy piece of ground, where *Lythrum hyssopifolium* was plentifully growing, though, of course, not in flower. *Ranunculus hirsutus*, *Orchis latifolia*, *Bartsia viscosa*, and *Hypericum elodes*, also occurred. Nearing L'Étac, the roadsides were bordered with *Sinapis incana*, and a wet meadow was adorned with the rich purple

Orchis laxiflora. *Chenopodium murale* occurred in the village, *Atriplex Halimus* being used as a hedge-plant.

St. Ouen's Bay is about six miles long, and is bordered with sandy tracts cultivated wherever possible, in some cases potatoes being planted in the actual sand, where *Carex arenaria* and *Festuca rubra* are agrarian weeds; but the uncultivated portions shone as a field of gold with *Raphanus*, *Brassica*, *Chœiranthus*, *Sinapis incana*, and other Cruciferæ. The roadsides yielded *Lotus diffusus*, *Allium vineale*, *Silene conica anglica*, *Trifolium striatum* and *subterraneum*, with stems 18 in. high; while, growing among the silvery abundance of the long-awned *Bromus maximus* and *Festuca uniglumis*, appeared *Medicago minima* and *Armeria plantaginea*, with other sand-loving plants.

On the hot toilsome walk across fields of small dimensions enclosed by stone walls of rickety structure, specimens of *Orchis laxiflora*, *Bartsia viscosa*, *Cyperus longus*, and *Enanthe crocata* were noticed. An exploration of the shingle was next attempted, when a solitary specimen of *Crambe*, a very rare Sarnian plant, was seen. *Euphorbia Paralias* was frequent, and is occasionally frequented by the larvæ of *Sphinx Euphorbii*. *Diotis maritima* was not plentiful, but *Atriplex arenaria*, *Salsola kali*, and *cahile* were very common. Standing by the shingle, and looking over to the sand dunes, a beautiful sight was presented by the great quantities of *Matthiola sinuata* in magnificent bloom, growing with the glaucous *Eryngium* and glaring golden *Brassica*. By the second Martello tower a nice patch of *Lagurus ovatus* occurred, and plenty of *Orobanche amethystea*, while here and there might be seen bleached skeletons of *Mibora minima*. Between the sea and the hills appeared great patches of *Centaurea aspera*, the lower flowers of which were only in bloom. On reaching the hill slopes, a complete mass of beauties presented themselves, so that the exclamations of admiration, which had been popping off at no distant intervals all day, now came by volleys; and down we lay among thousands of *Dianthus prolifer*, *Linum angustifolium*, *Orobanche cœrulea*, *Centaurea aspera*, *Centaurea paniculata*, and *Scabiosa maritima*. Next came a descent to St. Ouen's Pond, where, having seen *Cladium Mariscus*, we came upon *Scirpus Tabernaemontana*, followed by its rarer relative *pungens*, and eventually *maritimus* and *pauciflorus*; then came the prettily-veined leaves of *Potamogeton plantaginens* and the fugacious flowered *Alisma ranunculoides*; after which a long search was made for the leaves,—it was too early for the flowers,—of *Spiranthes æstivalis* and *Epipactis palustris*. On the road to the Corbières, *Kœleria cristata*, near *albescens*, *Corynephorus canescens*, *Radiola milligrana*, *Trifolium arvense*, *Lepturus filiforme*, *Corvolvulus Soldanella*, *Bromus Lloydianus*, and *Sclerochloa loliacea* were found, but *Solanum miniatum* searched for without

success. On the hill-slope below La Moye came a tract of ground covered with *Sarothamnus prostratus*, on which grew some fine *Orobanche major*. About here Mr. Piquet had a week previously found *Linaria Pelisseriana* in plenty, but as we had searched without success a few days after, were not very sanguine about adding it to our store; but, however, we carefully searched among the *Cuscuta*-covered *Ulex* and prickly *Ruscus*, and then, as these became less frequent where the hill-side was purple with *Echium violaceum*, and then higher still among myriads of *Sedum Anglicum*, *Juncus capitatus*, *Trichonema columnæ* in fruit, *Radiola milligrana*, *Helianthemum guttatum* surrounded with its quickly-falling petals, *Silene conica*, *Lotus angustissimus*, *Aira præcox*, and *Euphorbia Portlandica*, but no *Linaria*. Some Jersey cows were browsing eagerly about the gorse clumps; and as Mr. Piquet said they are very fond of the *Linaria*, its disappearance was at once laid to their charge. As no ready means of revenge presented itself, another search was made, this time rewarded with *Asparagus prostratus* and *Asplenium lanceolatum*, and at last, with the real Simon pure in fruit. Having mercy upon it, we selected only a scrap or two, and, elated, set off at a fast rate for St. Brelade's, where suddenly we had to halt to avoid the desecration of trampling upon a few hundreds of *Trifolium strictum* growing some 10 in. high. Descending to St. Brelade's, *Silene nutans*, *Silene quinquevulnera*, *Sedum dasyphyllum*, and *Delphinium Ajacis* were picked. The road to St. Aubyn's was bordered with *Silene nutans* and *Scrophularia Scardonita*; while, with vasculi, hats, books, and hands full of specimens, we trudged along up the sandy road, scarcely deigning to notice *Polycarpon tetraphyllum*, *Oxalis stricta*, *Epilobium lanceolatum*, and *Hieracium pilosissimum*, reaching St. Aubyn's in time for the train to bear us round the beautiful bay to St. Helier's, where something more solidly sustaining than cocoa had to be discussed previously to putting in press our numerous and rich collection.

G. C. DRUCE.

AN AUTUMN RAMBLE IN EPPING FOREST.

PART I.

BY DR. DE CRESPIGNY.

TO procure specimens of a late-flowering and uncommon Chenopod (*C. urbicum*) from a locality on the borders of Epping Forest, we had lately occasion to make an excursion in that direction, when the opportunity was taken advantage of for a ramble through the shaded dells and broken uplands of the forest in search of fungi, which are always to be found there on the setting in of the autumnal

rains, in great variety and abundance. Many clearances have been made of late years in the neighbourhood of Walthamstow and Wanstead; consequently, although there are still many unenclosed patches of woodland thereabouts, of which the most considerable extends southwards of Wanstead, we can hardly consider ourselves fairly within the precincts of the forest proper until we have left Woodford behind us. Traversing, then, one of these detached woods—which that which lies between this place and Walthamstow,—we

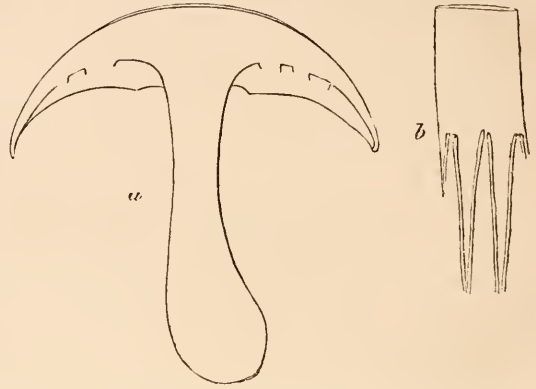


Fig. 206. a. Vertical section of an Agaric (*Tricholoma nutans*).
b. Ditto of lamellæ of ditto showing the trama continuous with the pileus.



Fig. 207. Filamentous Trama of an Agaric (*Amanita rubescens*.)



Fig. 208. Persistent Scales of the Cuticle of *A. (Leptota) rachodes*.



Fig. 209. Section of *A. (Pleurotus) ulmarius*.



Fig. 210. Decurrent lines and ring on the stem of *Amanita rubescens*.

turn down the Chingford road into the hollow below, where a lane, right, leads into a copse bordered by a rill and a narrow strip of pasturage; beyond, left, is the warren and farmhouse, well known to excursionists as Queen Elizabeth's Lodge; onwards, a footpath to High Beech Hill. Forcing our way in this direction, at one time with difficulty through tangled and almost impenetrable thickets, at another crossing some open grassy glade, or stretch of

pollard oak and hornbeam, where bramble and blackthorn scrub gave place to an undergrowth of bracken, and where progress was easier and less irksome, we gathered as we went anything and everything in the shape of fungus we could see, retaining, however, only two or three specimens of each kind. From the "King's Oak," near High Beech, the high road to Epping traverses the very heart of the forest :

hence it is not far from an ancient intrenchment, called "Amesbury Banks," and whence we retraced our steps through dense thickets and interminable groves of lopped beech and other trees, until we reached the picturesque slope which rises behind Loughton.

As anticipated, the heavy rains of August had produced a more than usual abundant crop of fungi ;

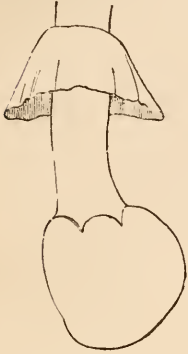


Fig. 211. Ring, Bulbous Stem, and Volva of *A. (Amanita) phalloides*.

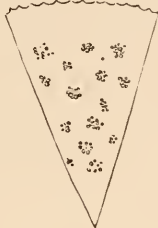


Fig. 212. Cuticle of *A. (Amanita) vi-bescens*, showing the scattered mealy warts of the cuticle.



Fig. 213. Bulbous Stem and warted Cuticle of *A. (Amanita) Cocillie*.

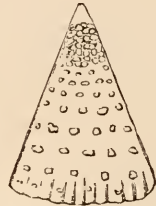


Fig. 214. Section of fistulose Stems of *A. (Hypholoma) fascicularis*.



Fig. 215. Floccose Trama of a *Cortinarius (Trichloma) violaceus*.



Fig. 218. Umbonate and Fibrillose Pileus of an *Hebeloma*. Subumbonate Fibrillose Pileus of a species of *Hebeloma*.

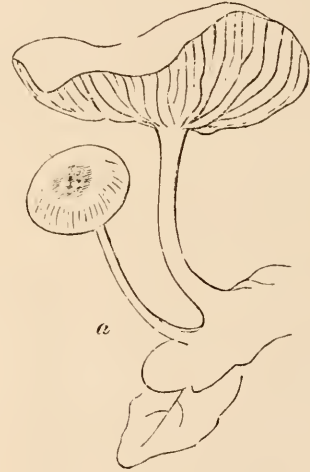


Fig. 217. *Clitocybe laccatus*.

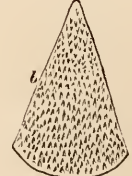


Fig. 216. Mealy subsquamulose Pileus of *Clitocybe laccatus*.

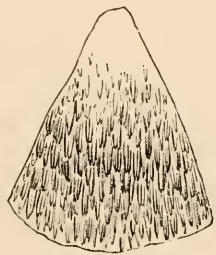


Fig. 219. Pileus clothed with innate hairy scales of *Pholiotia aureus* (magnified).

trudging onwards, first on one side and then on the other of this road, another central station is reached—"The Wake Arms," and where it is crossed by the road from Waltham Cross to Theydon Bois ;

and on sitting down next day to examine and sort the contents of our pockets, hat, and vasculum, we felt fairly bewildered at the sight of the spoils, and hurried multitudinous entries in our note-book.

To take them scientifically, and in proper order of sequence, let us commence with the Agaricini ; those with a gilled or plated hymenium : these, of course, were the most numerous, and were easy to separate from the rest. Referring to "Berkeley's British Fungology," we find that they are all included in fifteen genera, of which some three or four are rare, or have but few representatives in England ; on the other hand, the Agarics proper are so numerous as to comprise twenty-seven sub-genera, arranged in five sections, according as the colour of the spores is white, salmon-coloured, tawny or ferruginous, purplish or brown, and black. The characteristics

of the genus are persistent membranous gills and a filamentous trama continuous with the pileus; but those of the sub-genera are very miscellaneous and confused: differences in the character of the velum or veil, whether present or present only in the form of an annulus, or wanting entirely in any shape; confluence or otherwise of the hymenophorum with the stem; decurrence or other peculiarity of the lamellæ; peculiarities of the stem, of the pileus, of its margin; presence of a volva or absence thereof. In one sub-genus there is no stem—*Pleurotus*. Of this we gathered a specimen from the dead trunk of a tree: the gills are narrow, and margin of the pileus remarkably incurved. Illustrative of the scaly-cuticled sub-genus *Lepiota* we found a few specimens of *L. rachoides* growing singly in a hedge; besides this peculiarity, it has a stem furnished with an annulus, and is altogether a pretty little plant. Not unfrequently *A. (Amanita) rubescens* was met with, rather a handsome fungus with a brownish warty cuticle and white gills, bulbous and ringed stem: the rubescent character is not very decided, sufficiently so, perhaps, to warrant the use of the term; the bulb and stem when broken exhibited this characteristic more clearly than the pileus: edible.

Less frequent was another,—not edible as this, but very poisonous species, *A. (Amanita) phalloides*, with stem strongly ringed, and a bulb furnished with a volva free above; white, except the upper part of the pileus, which has a yellowish tinge. A ringless but bulbous fistulose-stemmed *Amanita* we found in *A. Cecilia*, also furnished with a volva, and with a pileus more persistently warted than that of *A. rubescens*. It is a much smaller species, and the brownish colour of the pileus is of a colder shade, greyish or mouse-coloured. *A. (Tricholoma) nudus* we observed only in one place, a handsome, but probably very dangerous mushroom: there was one small patch of it, three or four growing closely together (fig. 206). Pileus obtuse, moist, pale violet shaded with brown; gills and short, thick bulbous stem of a beautiful violet throughout. The warted scarlet pileus of *A. muscarius* we looked for in vain,—one of the handsomest, at the same time one of the most poisonous of its tribe. (*Tricholoma A. personatus* is more frequent, but grows singly, here and there, in open grassy places: the pileus is convex, obtuse even, moist and of a pale ochre-colour; gills dirty white, stem ringless, firm, and covered with a stain of pale violet. On the stumps of decayed or felled trees was the well-known *A. (Hypholoma) fascicularis*, with its dull rufous-coloured pileus, passing into yellow at the borders, yellow fistulous stems, and greenish-grey gills: and in many parts of the forest growing in patches, often of a circular form, *H. sublateritius*, much like the preceding species.

Examples of a section of Agarics (among our specimens), characterized as having pilei clothed with fibrillose scales, usually umbonate (*a*), or sub-

umbonate (*b*), and fibrillose stems, we have in two kinds of *Hebeloma*; the colour of the cuticle in *a* is golden brown: and in *A. (Clitocybe) laccatus* we have a pileus the very reverse of umbonate, viz., the umbilicate form: it grows on dead leaves abundantly in the forest; colour variable, from flesh-coloured to cinereous grey and pale cobalt. *Clitocybe candicans* is also plentiful. On the margin of a pond, not far from the "Wake Arms," we obtained several fine specimens of *A. (Pholiota) aureus*, a mushroom remarkable for its pileus brilliantly coloured of a golden tawny hue, and, examined with a lens, sprinkled with closely adpressed or innate hairy scales of an orange colour, which impart no doubt a brilliancy to the plant in its living state, but which fades away when no longer fresh.

Last, and not by any means least of the Agarics, is a tall species of *Collybia (C. radicans)*, plentiful in the wood behind Loughton. It is furnished with a long tap-root, the stems at least six inches long, slender, and tapering upwards; pileus of a greyish brown, smooth, moist, plane, and umbonate.

(To be continued.)

A GOSSIP ABOUT NEW BOOKS.

ON nothing does a "war fever" leave its mark more impressively than scientific literature. The tide of true progress is then stemmed, if not rolled back. The literary history of the last two years proves how few important works of science have issued from the press. And yet that period has been marked by scientific discoveries of the most important and even sensational character. It is the epoch of the Telephone, the Microphone, and Phonograph; of the Radiometer, Otheoscope, and other instruments, which revealed to us the molecular mysteries of matter.

It is with much pleasure that we turn to a short notice of a few books which have for the last month or two been accumulating on our library table. The short space at our disposal does not enable us to do that justice to some of them which they require. "Tropical Nature," by Alfred R. Wallace (London: McMillan & Co.), deserves a leading place in any notice of new books. The volume consists of a series of essays, chiefly relating to animal and plant life in equatorial regions, speculations as to the colours of birds and animals, flowers and fruits, and how they have arisen through the process of natural selection. All are written in that delightful manner which characterizes Mr. Wallace's other books. The chapter on humming-birds is one of the most charming ever penned by its original writer. That on the distribution of animals as indicating geographical changes is a remarkably clear piece of philosophical generalization. By this time most readers of natural history will have read "Tropical Nature," and our advice to those who have not yet had the opportunity is that they should

read it as soon as possible.—“West Yorkshire ; an Account of its Geology, Physical Geography, Climatology, and Botany,” by Messrs. James W. Davies and F. Arnold Lees (London : L. Reeve & Co.). This book contains much valuable work. Few counties are more interesting geologically than Yorkshire, and many books and papers have been written upon it. All of these have here been duly arranged chronologically, and the authors always refer to such of their literary predecessors as have furnished them with material. The geological portion is written by Mr. James W. Davies, the hon. sec. of the Yorkshire Geological Society, and all geologists will acknowledge that he has done his work conscientiously and well. The second part, devoted to physical geography and botanical topography, is the joint work of Messrs. Davies and Lees. The arrangement of the material is most excellent, and so clear and suggestive that the reader is enlightened instead of being perplexed by its abundance. Numerous maps and engraved sections assist the text, and these are of excellent execution. The geological structure of Yorkshire is treated of in detail, from the Lower Silurian beds to the Glacial series. The physical geography and topographical botany then follow in order, and one sees almost at a glance the relation between plant distribution and the physical geography of the valleys in which they occur, or the geological structure of the underlying rocks. A handsomely got-up volume of upwards of 400 pages thus represents a most creditable scientific industry on the part of the authors.

The new term of *Physiography* (as Physical Geography is now called) has called forth a series of “manuals” devoted to its exposition. How important is even an outline knowledge of nature has been shown by the success of Huxley’s little book on this subject. There is always the danger of causing shallow-minded students to imagine they have nothing more to learn when they have acquired a well-defined idea of natural phenomena as a whole ; and on that account we object to “physiography.” But if books have to be written on this subject, they may as well be in good hands ; and we are therefore pleased to notice “The Physical System of the Universe,” by S. J. Skertchley, F.G.S. (London : Daldy, Isbister, & Co.), which is intended as a manual of physiography. It is a book, however, which will delight those who do not intend “going in for examination” more than those who do, for it is a well-written and very clear outline of the universe as a whole, and of the unity of natural forces. We know of few recent books which comprehend so much in so limited a space. All the recent discoveries in physical, natural, and geological science are included in Mr. Skertchley’s book. It is a work which we hope will be read with the same pleasure that we have ourselves derived from it.

“A Science Primer,” by the Rev. Dr. Macvicar (London : W. Blackwood & Sons), although a small book in comparison with those above men-

tioned, is a remarkable one in many respects. It professes to deal with “the nature of things.” Its author is a man possessed of great ability, extensive reading, and a brilliant power of speculating. There are many subjects briefly discussed, especially those relating to molecular physics, which strongly impress us by the undoubted ability and originality of view with which they have been treated. Our readers will not always agree with the author, but few will come away from this suggestive little book unimpressed with new ideas.

“The History of Glanville’s Wootton,” by C. W. Dale (London : Hatchard, Piccadilly), is a detailed account of the archæology, zoology, and botany of a district in Dorset, after the manner of White’s “Selborne,” only arranged in chapters, instead of being given to the world in the form of letters. The book is very well got up, with capital paper and in clear type, and the few photographs which illustrate it are excellent. As for the rest, the work consists of lists of animals, vertebrate and invertebrate, and of plants, phanerogamous and cryptogamous, which have been found in the district of Glanville’s Wootton. Mr. Dale has devoted much time and careful labour to his task, and as a consequence has given a very valuable little monograph to the world.

“A Handbook for England and Wales” (London : John Murray), which should give, alphabetically arranged, a short and trustworthy account of every town, village, and place of importance, with all relating to them of archæological, geological, botanical, or geographical interest, was a happy idea. A handier book of reference could hardly have been prepared than has been now compiled. All depended, however, upon the author and his ability to select just such material as would be valuable to the traveller, tourist, or student. We are happy to say that this has been done in the present work, and that, having tested, from personal knowledge of numerous places referred to, the pains taken by the author to insure accuracy, we believe it to be one of the best books of its kind which the well-known publishers have issued.

“Holmes’s Botanical Note Book,” by E. M. Holmes, F.L.S. (London : Christy & Co.), may be utilized by the student as a means of acquiring a practical knowledge of botany. It contains diagrams showing the parts of flowering plants, directions for examining plants, the microscopical examination of plants, directions for describing plants in schedules, and a glossary. The schedules, however, form the principal part of the work, and these may be obtained separately of the publishers. The printed head-lines oblige the student to note down every feature of a plant, and in this way he will soon learn to look out for particulars which are too frequently shunned, because deemed troublesome to detail. We are much pleased with Mr. Holmes’s note-book, and heartily recommend it to students.

“A First Catechism of Botany,” by John Gibbs

(London: Simpkin, Marshall, & Co.). This is a new and enlarged edition of a very noteworthy little book, written by a botanist who is a frequent contributor to our pages. We have before expressed our liking for the book, and are glad to see it revised and enlarged. All young botanists would do well to get it.—“The Creation of Moses and Science in Harmony,” by Dr. Alex. Stewart (London: Elliot Stock), is another of those laboured productions in which so much intellectual force is thrown away in attempting to harmonize what have never been disturbed, except by men themselves. They frequently consist of bad geology and weakened theology, and are usually unsatisfactory. Correct science needs no harmonizing: incorrect science soon gets corrected. Meantime the great truths which theology has in its keeping have a sphere entirely apart from scientific investigation. As might be expected, the greater part of the book under notice is devoted to demolishing the theory of evolution. Would that such writers were wise in time! No “reconciliations” would then be needed.

To turn from these unsatisfactory subjects to note the appearance of the *ninth* edition of Proctor's “Half-Hours with the Stars” (London: Hardwicke & Bogue), is a pleasant change. The twelve plates of the maps are new, and in bolder execution, so that the astronomical student is considerably aided thereby. It augurs well for the spread of astronomical science when books of this class are so well received and largely circulated.

A capital little book on human physiology, simply but attractively written, is Mrs. F. Fenwick Miller's “House of Life” (London: Chatto & Windus). It is a work which should be in every family library, not to lie idly on the shelves but to be read by every member.—“The Sight, and how to Preserve it,” by Dr. H. C. Angell (London: Hardwicke & Bogue), is another work of a similar kind, bringing within intelligent knowledge those parts of our own frames about which we have hitherto been in such culpable ignorance. Perhaps no sense is so much valued by us as that of sight, and there is scarcely any other so abused. Take one hundred people whom nobody would call other than *educated*, and let them answer a few questions as to the structure of the eye and the nature of vision, and perhaps not five would pass the examination entitled to an elementary certificate! This ought not to be; and it is pleasant to see the leading medical specialists devoting what little spare time they have to popularly instructing the masses in the subjects to which the former have devoted long and useful lives. Nothing could be more understandable, more practical, or more useful, than Dr. Angell's remarks on “The Sight and how to Preserve it,” and everybody with eyes ought to read them.

“Nutrition in Health and Disease,” by J. H. Bennet, M.D. (London, J. & A. Churchill). This is the *third* edition of a valuable work,

chiefly written for public rather than special readers, but which the latter cannot fail to estimate very highly. The title is a very happy one, and rightly expresses the character of the work. Its aim is the same as that of the two little works just mentioned,—the endeavour to make people acquainted with their own bodies, and what is taking place in them every hour of the day under the name of “nutrition.”—“Phosphates in Nutrition,” by M. F. Anderson (London: Baillière, Tindall, & Cox), is a work of a similar important nature. Its endeavour is to show the importance of certain inorganic materials in the food, and their functions in the tissues. In this way the author's views lead him to some novel explanations of the causes of certain diseases hitherto but little understood. The chapter on the “Mineral Theory of Wasting Diseases” is especially noteworthy.

“English Folk-Lore,” by the Rev. T. T. Dyer, M.A. (London: Hardwicke & Bogue), cannot fail to be a popular and widely-read book. “Folk-Lore,” or the wisdom of the common people, as expressed in their proverbial and other sayings, has of late years been a fruitful study. All of us are acquainted with some of these sayings, and their quaint utterance frequently carries us back to the days of our childhood. There are scarcely any natural phenomena which have not been thus noticed; whilst the pages of our best poets frequently sparkle with the richest and quaintest of these gems of folk-lore. Mr. Dyer's book is a very attractive-looking volume, both outside and inside, for it has been given to the world in a handsome cover and good paper and print,—the very auxiliaries to make such a work successful. The author is very happy in his style, for it is light and airy without being flippant. Evidently he is interested to his subject, as he sometimes rises almost to enthusiasm. We have chapters on the folk-lore of plants, birds, animals, insects, and reptiles; the moon (a fruitful source of old-world sayings); besides half a volume relating to birth, death, marriage, &c.

MICROSCOPY.

THE CONGRESS OF MICROSCOPISTS, held at Indianapolis, Ind., August 14th, 15th, 16th, and 17th, was a great success as regards numbers present and results arrived at. Delegates were in attendance from all parts of the Union, sixteen societies being represented by delegates. Many papers of value to the working microscopist were read. Amateurs had ample opportunity to profit by the work of older workers. Results were compared, and many delightful acquaintances formed. Dr. R. H. Ward, of Troy, N.Y., was elected President, and Mr. H. F. Atwood, of Chicago, Secretary. One evening was devoted to a “*conversazione*,” at which the public attended, and were duly pleased with the popular slides which were chosen for their entertain-

ment. Perhaps the most enjoyable part of the meeting were the "séances," held each evening in the various rooms in the hotel. No such gathering of microscopists could come together and not bring about a discussion on "Angular Aperture"; high and low angles were both well represented, the former by such well-known authorities as Prof. J. Edwards Smith and Dr. Geo. E. Blackham, while Prof. Romyne Hitchcock, of New York, supported the latter. While the question will remain an open one for long time yet to come, it is but fair to say that many gentlemen who had always used low-angled lenses prior to the meeting, went away essentially high-angled men. Several of the American dealers made fine displays of microscopes and objectives. Of the English manufacturers, Beck & Crouch were fully represented through their respective American agents. Before the congress adjourned, the "American Society of Microscopists" was formed, Pres., Dr. R. H. Ward, Troy, N.Y.; Sec., Henry Jameson, Indianapolis, Ind.; Treas., H. F. Atwood, Chicago, Ill. The next meeting of the new society is to be held in August, 1879, at Buffalo, N.Y., and from its auspicious beginning, and the enthusiasm manifested by its members, it is fair to predict that the future meetings will be of more than ordinary interest.

MICROSCOPICAL SOCIETY OF LIVERPOOL.—The seventh ordinary meeting of this society was held at the Royal Institution, on Friday, the 11th October. After the ordinary preliminary business, a paper was read on "The Life History of a hitherto Unrecorded Septic Organism"; with drawings from life; illustrated by means of the Oxy-hydrogen Lantern, by Rev. W. H. Dallinger, F.R.M.S. At the conclusion of the meeting a conversazione was held, when the following subjects were illustrated:—"Algae, Marine," T. C. Ryley; "Carchesium Polypinum," natural state, mounted, Isaac C. Thompson; "Diatoms," Charles Symes, Ph. D.; "Durio Zibetharinus, — decolorized leaf of from Borneo," polariscope, the President; "Oscillatoria," mounted slides and alive, the President; "Polyxenes lagurus," Rev. W. H. Dallinger, F.R.M.S.; "Pond Life," George Thomas; "Section of Wigan Coal," John H. Day; "Spores of Fungi," Rev. W. Bannister.

A REMARKABLE PHOTOGRAPH.—The "American Journal of Microscopy" for August, 1878, describes a marvel of photographic manipulation in the form of a micro-photo of the Lord's Prayer. Our readers are well acquainted with the ordinary micro-photographs of engravings, &c., and for which a power of 30 diameters is usually the extreme limit of amplification which can be used effectively, the higher powers destroying the sharpness of the outline. The above-mentioned photo is only $\frac{1}{100}$ of an inch square, or $\frac{1}{10000}$ of a square inch (one of the squares in Maltwood's finder would contain it four times), and

will bear inspection with $\frac{1}{4}$ objective and B ocular. These slides are the production of Mr. Langenheim (of New York?).

ZOOLOGY.

MARINE DREDGING.—I have collected for years on the Lancashire and North Welch coasts, and I thought I should like to try a fresh locality. Knowing the ruggedness of the coast scenery of the Isle of Man, I proposed making that place the theatre of my operations, and I can certainly say I never saw happier hunting-grounds for the naturalist. Anemones by thousands, Algae, Red, Brown, and Green, in wonderful profusion; in fact, almost every department of Marine Zoology is well represented. I was enchanted, and determined that next year, if spared, I should devote a week or so to collecting. A friend of mine who brought some anemones back with him, sent for me to name them for him. Among a lot of *Actinia mesembryanthemum*, *Tealia crassicornis*, *Anthea cereus*, &c., I found one I had not previously seen, but which I had no difficulty in recognizing as *Bunodes gemmacea* (the Gem Pimplet of Gosse). It is a charming animal, well worthy of its name. It is still alive and healthy, having had two feeds of mussel. The only locality Gosse gives for this anemone is "the south-western and southern shores of England and Ireland, on exposed rocks and shallow pools between tide-marks." If this locality is new, I gladly record it for the benefit of brother naturalists. It is not uncommon even in Douglas Bay. In answer to "C. E. R.," I may say this anemone requires no peculiar treatment. It is easy to keep alive if the aquarium is in good condition; also, the best method of feeding baby anemones is to let them feed themselves, and they'll not starve. In fact, none of the animals in a large tank I had were fed for twelve months, and I can aver that there were no deaths, and the whole affair required less looking after. I am much obliged to "H. C. C. M." for description and figure of Tangle-dredge. I have no doubt it will be a very useful instrument to the marine zoologist. I was very sorry to hear of his want of success, but can readily divine the cause. Since the establishment of public aquaria there has sprung up at various parts of the coast quite an army of collectors. The locality he mentions is very familiar to me, having collected on its shores and dredged in its deep waters many times. The channel in the straits (north entrance) is very narrow, and runs close to the Anglesea shore, but my boatman took me to dredge on the low banks of mud, which I knew were exposed every tide, and it was only on showing him I knew better that I got my dredge down on prolific ground. I have tried many times to procure a "Ball's Naturalists' Dredge," but have as yet been unsuccessful; none of the London fishing-tackle-makers know anything about

it. Could you or any of your numerous readers tell me where I could get it?—*J. E. Lord, Rawtenstall.*

A SEAL IN A TRAP.—A seal has recently been engaged in exploring the interior of Suffolk. It ventured up a dyke near Leiston, in Suffolk, and was shot whilst lying there. As one might have expected, it was a *young* animal, weighing just thirty pounds, and measuring forty-one inches in absolute length.

LIVING BEETLES AS FEMALE ORNAMENTS.—We hope the attempts to introduce living exotic beetles as female ornaments will fail, if only in the interest of the animals themselves. We read in a fashionable newspaper of one which has been adorning a lady's shoulders for six weeks, and subsisting for that period without food! The lady did not know (and probably did not care) how long it had been without food before she had it; and as it came from central America, it may have been some time. Are we so hard up for ornaments that we must resort to these aboriginal customs? They are understandable in the case of those African beauties who are obliged to dispense with any other dress, but we have not quite retrograded to that condition.

"SCIENCE MADE EASY."—Under this title Mr. Thomas Twining has issued a series of six familiar lectures on all kinds of scientific subjects, but chiefly those bearing on economic industries. They are issued in shilling parts by Hardwicke & Bogue, 192, Piccadilly. The type is large, and pleasant to the reader's eyes; the illustrations of the very best and most effective kind. Science teachers and others interested in the spread of scientific education will find these "Lectures" invaluable. We should like to see them used in every Board School in the kingdom, and we would strongly advise such of our readers as are connected with those institutions, either as managers or committee, at once to obtain copies of these lectures, and endeavour by their means to lay that foundation of scientific instruction which to England, more than any other country, is absolutely indispensable.

POPULAR SCIENCE.—The *Popular Science Review* for October contains articles on "The Sand and Brittle Stars," by Professor Martin Duncan; "Coal and Colliery Accidents," by Mr. C. De Rance, F.G.S.; "The Radiolaria as an order of Protozoans," by Dr. Wallich; "The Eucalyptus globulus," by M. Betham Edwards; and on "The Extinct British Wolf," by J. E. Harting, F.Z.S.

RARE BIRDS.—From various paragraphs in last month's *Zoologist* we gather that the Hoopoe has been unusually abundant this year on the south and south-western coasts. Observers mention it as being seen at Chichester, in the Isle of Wight, and near the Land's End. It has also been seen near Gloucester. As one might expect, in most places the beautiful stranger was *shot!* Perhaps in time natural selection will endow rare birds with more sense than to approach the English coasts.

PROVINCIAL NATURAL HISTORY.—We have received a copy of Part 4, vol. ii., of the "Transactions of the Norfolk and Norwich Naturalists' Society," containing a most able address by the President, Mr. F. W. Harmer, F.G.S., which deals chiefly with the difficulties of the Darwinian theory, and is a capital defence of it against some recent attacks. It also contains papers on the Norwich crag, by Mr. Harmer; a list of plants found near Cromer, by Professor Babington; letters relating to the Natural History of Norfolk, by Mrs. R. Lubbock and Professor A. Newton; on William Arderon, an old Norwich Naturalist, by F. Kitton; notes on Norfolk Mammalia, by F. Norgate; Meteorological Notes, by John Quinton, jun.; Ornithological Notes, by H. Stevenson; and Heteroptera and Homoptera of Norfolk, by J. Edwards. The "Report of Proceedings" of the Norwich "Science Gossip Club" has also been forwarded to us, containing an abstract of all the papers read last winter, embracing a variety of scientific subjects, all ably and intelligently treated, together with the Address of the President, Mr. S. C. Sothorn. This is a very popular society; and one which those young naturalists would do well to correspond with who wish to found an unpretending science club. Part 10 of vol. i. of the "Transactions of the Watford Natural History Society" is also to hand, containing index, list of members, &c.

THE KINGFISHER IN LONDON.—On Monday, 30th September, when crossing Westminster Bridge, I was surprised to see a kingfisher fly across the Thames from the Houses of Parliament towards St. Thomas's Hospital, and then cross the bridge and fly down the river. It seemed at a loss to know where to settle. I see by the *Standard* it has been noticed lately in the Serpentine.—*J. L. Hawkins.*

THE BOTTLE-HEAD WHALE.—On the 31st August I wrote a letter to the editor of *Chambers's Journal* respecting the capture of a cetacean. It happened on the 22nd ult. near Nice. He advised me to forward to you the drawing and description of the same. As to external appearance, this cetacean had a great likeness to the Bottle-head, of which a description is given in Chambers's "Encyclopædia," except that the surface of the body was all over covered with narrow irregular white stripes; but when I went on the spot (three days after the capture) they had almost disappeared. A more remarkable difference between the two specimens lies in the skull, as you can judge from the adjoining drawing. Would not this induce us to establish a new species of *Hyperoodon*, contrary to the general opinion that there exists one species only? The total length of this cetacean was 5·70 mètres. It was driven ashore alive, and was condemned to total destruction had I not interfered. The skeleton has been so preserved and brought to Nice. A similar, but not quite identical specimen, was caught many years ago on

our coast, and described by our naturalist Risso. There were stripes on the body, as in the present one, but the forehead was even more flat, and the dorsal fin trapezoidal instead of triangular; so, at any rate, it was represented by a drawing. No description was given of the skeleton.—*Hippolyte de Pierlas, Nice.*

BOTANY.

ALPINE FLOWERS.—Hermann Müller writes to *Nature* to say that in the Alps he has found some instances of different forms of flowers in plants of the same species, which, as far as he knows, have been hitherto undescribed; of which he gives a short notice as follows:—*Geranium sylvaticum* is in one locality near the Albula Pass gynodioecious, with large-flowered hermaphrodite, and small-flowered female stems. *Veratrum album*, *Dryas octopetala*, and *Geum reptans* are in all the localities where he has examined them androdioecious. *Astrantia minor* offers a quite peculiar sort of androdioecium, some stems bearing, as in other *Umbellifere*, in the same umbel hermaphrodite flowers and male ones, other stems producing solely male flowers. *Dianthus superbus* seems at first sight to exist in three forms: (1) Stems with hermaphrodite flowers, being perfectly protandrous and producing a moderate quantity of whitish pollen; (2) stems with female flowers containing very conspicuous rudiments of stamens, but pollenless anthers; (3) stems with pistils remaining imperfectly developed, and with anthers containing abundance of a brown powder. At first sight H. Müller thought their flowers to be male, and the brown powder to be pollen-grains; but under the microscope the latter proved to consist of grains, the diameter of which is only about one-eighth of that of the pollen-grains of the hermaphrodite flowers. He supposes, therefore, these grains to be the spores of some species of fungus, and *Dianthus superbus* to be gynodioecious.

VEGETABLE TERATOLOGY.—The state of *Plantago lanceolata* in which the spike is replaced, surrounded or surmounted by a tuft of leaves, appears to be very plentiful this season, as I gathered no less than thirteen such specimens, all growing in different places, when taking a walk on August 16th. In several of these the spike is surmounted by from two to five leaves, while in others a second spike springs from the centre of the leafy tuft. In one specimen the rosette of leaves surmounting the stem is pretty large, and ten spikes spring from its base, their stems varying from half an inch to four inches in length, and the whole forming a sort of irregular umbel. The dry summer, succeeded by showers at the end of July and beginning of August, has probably something to do with the unusual abundance of these curious aberrations.—*D. Douglas, Leith.*

BEECHES AND HOLLIES; OAKS AND HAWTHORNS.—A friend of mine tells me that about the middle of September he was in the New Forest, where he noticed that beneath the large beech-trees there was an abundant under-growth of hollies, but no hawthorns, whereas under the oaks there was an abundant growth of hawthorns, but no hollies. I should be glad to have an explanation of this.—*R. H. Alcock.*

"FLOWERLESS PLANTS."—Under this title Dr. Franklin Parsons has contributed two most readable articles in the recent numbers of *The Naturalist*, which, as our readers are aware, is the journal of the Yorkshire Naturalists' Union, and their general field club record. Some time ago we heard a whisper that *The Naturalist* would have to be discontinued for lack of support. We sincerely hope our Yorkshire friends will not allow such a stigma to fall on their hearty and generous county.

VEGETABLE MOTH-TRAP.—Mr. W. Simpson, of Dartmouth, has described a large plant of *Physianthus albicans*, belonging to the *Asclepiade*, which flowers there in the autumn very profusely. He says it is one of the most deadly moth-traps he knows. Many days running he found from two to eight Hummingbird Hawk-moths caught by their probosces in the flowers, where they died in about two minutes. Other insects were also found dead in the flowers. The plant is of trailing habits, and easily trained over porches. Have any of our correspondents noticed its insecticide habits?

EUROPEAN FUNGI.—All botanists will be rejoiced to hear that Dr. M. C. Cooke, A.L.S., and Mons. L. Quelet, M.D., have written conjointly a work, entitled "Clavis Synoptica Hymenomycetum Europæum," which has been just published as a handsome little volume by Messrs. Hardwicke & Bogue at 7s. 6d. In this book every species of fungus heretofore found in Europe is described in brief but excellent and easily understandable Latin; so that it is a work which thus requests a world-wide circulation. The high reputation of its authors as fungologists must make the present work a hand-book to all botanists.

DOUBLE FLOWERS.—A few days ago we examined the flowers of the common *Petunia*, and found the stamens had developed into petals. Each so-formed petal was distinct, so that the internal structure was thus polypetalous. We have noticed that whenever the stamens are thus modified in gamopetalous flowers, the newly-formed petals do not cohere. Does not this indicate that polypetalous corollas must have preceded the gamopetalous in the order of floral evolution?

"THE HEREFORDSHIRE POMONA."—Under this title the first part, price 15s., has just been issued by Messrs. Hardwicke & Bogue, of a most magnificent work, containing coloured figures and descriptions of the most esteemed kinds of apples and pears.

coloured plates are of the very highest degree of excellence, and it is long since we have seen illustrations of natural-history books so artistically executed. There can be no doubt that this artistic superiority will of itself give this much-needed work an extensive circulation. It is edited by Dr. Robert Hogg, F.L.S., and is chaperoned, we believe, by the well-known and energetic Woolhope Naturalists' Field Club. The letter-press contains outline woodcuts of every variety of apple and pear in cultivation, besides other engravings of high merit.



Fig. 220. Median proliferation in Common Daisy.

MONSTROSITY IN THE DAISY.—The above is an illustration of median proliferation occurring in a specimen of the common Daisy (*Bellis perennis*) found at Cobham. It occurs frequently in gamosepalous and gamopetalous flowers, when it is known under the term of "hose in hose," but we have never seen it before in a composite flower.

GEOLOGY.

THE LATE MR. THOMAS BELT, F.G.S.—It is with much regret that we have to announce the death of Mr. Thomas Belt, F.G.S., one of the most distinguished of the younger school of naturalists, who died after a short illness, of rheumatic fever, at Denver, United States, in the 46th year of his age. He was a frequent and valued contributor to our columns, and only a few weeks ago sent us the account of his discovery of a human skull at Denver, under circumstances indicating high antiquity. He was the author of several works on natural history, the best known of which is the "Naturalist in Nicaragua."

WHAT ARE CONODONTS?—At a recent meeting of the Natural History Society of Glasgow, Mr. John Young, F.G.S., read some notes on a group of fossil organisms termed Conodonts, which have recently been discovered in the Carboniferous limestones of the

Ayrshire coal-field by Mr. John Smith, of the Eglintona Ironworks, Kilwinning. These organisms are minute, slender, conical, tooth-like bodies of varying forms, of a brownish colour, and having a glistening or enamelled appearance; few of them exceed an eighth of an inch in length, many of them being much smaller; they are mostly of a comb-like form, being serrated along one of the sides with a row of teeth, often of unequal length and stoutness. Conodonts were first brought under the notice of geologists by Dr. Pander in 1856, in a work descriptive of the fossil fishes of the Silurian formation in Russia, in which country they are found ranging in strata from the Upper Cambrian to the Carboniferous deposits. In America they have also been discovered in the Devonian and Carboniferous formations; Professor Newberry having figured and described a number of Carboniferous forms in his work on the palæontology of Ohio. But until this discovery of Mr. Smith's, no remains of Conodonts seem to have been noticed in the strata of the several formations in Britain. Mr. Young stated that he had recently the opportunity of submitting Mr. Smith's specimens to a Canadian palæontologist, Mr. Jennings Hinde, while on a visit to this country, and he stated that they were closely related to the American forms, especially to those described by Prof. Newberry. Although Conodonts have now been known to palæontologists for more than twenty years, great doubts still exist as to what group of animals these curious teeth-like organisms belong. Dr. Pander, their first discoverer, thought they were the teeth of a group of cyclostomatous fishes allied to the present lampreys. Professor Owen doubts their fish affinities very much, and says some of them may be the dentated claws of small crustacea; others may be the teeth hooklets or denticles of naked mollusca or annelides. Professor Newberry thinks Dr. Pander is right in referring them to fishes; if so, fish-life will have to be carried forward to a much earlier period in the history of our globe (namely, the Cambrian), no undoubted fish-remains being at present recorded from strata older than the Upper Silurian. These Conodonts are found in both the upper and lower limestones of the Ayrshire coalfields; upwards of thirty forms have already been discovered, and it is probable the number may be increased by further researches in the deposits. Along with the Conodonts, Mr. Smith has also found a new group of fossil sponges, different from those of *Hyalonema*, which he discovered last year in the Lower Limestone series at Cunningham Pedland, near Dalry. The silicious spicules of this new group of sponges from the Upper Limestone are of various types, and Mr. Young stated that at present the forms were being examined by Professor Young and himself, and they intended bringing them up at a future meeting. The same deposit also contains an interesting group of small forms of mollusca, in a fine state of preservation, many of the univalve or spiral shells, having their mouths

quite entire, and several of them being of species not formerly recorded from the Carboniferous strata of the West of Scotland.

PERPENDICULAR HOLES IN ROCKS.—In a section of what is, I believe, inferior oolite, underlying sand at Manton Warren, near Kirton-in-Lindsey, Lincolnshire, there are exposed to view perpendicular holes of some ten inches in diameter, passing through the successive layers of stones, and through the stones themselves, as if bored. A depth of 5 ft. is exposed to view, but how much deeper they go I do not know. I observed three within a few feet of each other. The diameter does not appear to decrease with the depth. Will any one state the probable origin? Are they "pot-holes"? The stone obtained has been broken up for roads. The warren is elevated above the surrounding country.—*J. N. D., Tuxford.*

A NEW EOCENE MAMMAL.—A new genus of pachydermatous mammals, nearly allied in its dentition to *Palcotherium*, has been recently found in the Lower Eocene beds of Transylvania. The fearful generic name of *Brachydiastematherium* has been given to this extinct creature.

A NEW OOLITIC PTERODACTYLE.—Hitherto no Pterodactyle remains have been found in America of older date than the Cretaceous period. News comes to us, however, of a species of *Pterodactyle* which has just been found in the Oolitic rocks of Wyoming, whose outspread wings must have been five feet from tip to tip. It has been named *P. montanus*.

GEOLOGY OF THE AMERICAN LAKE REGION.—Mr. George Maw, F.G.S., writes as follows on this subject:—"We must set aside the view that the chain of large lochs is due to glacial excavation; for Ontario, the deepest of the lakes, running east and west, is in lower latitude than Huron, the bottom of which is 510 feet above that of Ontario; and there is no high ground about Ontario from which ice could have originated as a preponderating mass, capable of excavating Ontario 600 feet deep; nor is there any mass of débris anywhere to be seen about the lake as would represent such an excavation."

NOTES AND QUERIES.

WATER-BOATMAN.—Your readers, who are no doubt familiar with the very savage instinct of this insect, may be interested to learn my experience of him. He really appears to be quite shark-like in his nature. A few weeks since, whilst staying with some friends in Cambridgeshire, to amuse the children I collected from several ditches various Sticklebacks, Whirligigs, Newts, a Frog, &c., and three Water-Boatmen. These I thought might possibly make a nice little "happy family"; but my hopes were doomed, as the boatmen soon proved themselves to be most formidable. They attacked each of the

animals before-mentioned except the Whirligigs, whose movements were too quick for them. After killing the insects and Sticklebacks, one fastened himself to the frog's leg.—*H. Hall.*

LABURNUM FLOWERS.—Laburnum trees are in blossom here now (September). Is not this an unusual phenomenon?—*R. H. Nisbet Brown, Folkestone.*

PALM ROOTS.—With reference to the question propounded in your issue for October, as to whether palm-trees have tap-roots or not, I find, on consulting the highest authorities in the library of the Linnaean Society, that the roots are fibrous masses. Stephen Endlicher, in his "Genera Plantarum," published in 1836-40, writes thus:—"Palmæ Plantæ liquescentes, acrobryæ habitu peculiari. Radix palaris, mox evanida; radice plurimæ, cylindricæ, simplices et ramosæ, fibrillose, in molem conicam sæpè ex parte hypogæam densè compactæ." Loudon, in his "Encyclopædia of Plants," writes:—"The lofty stems of palms are supported by a mass of fibrous roots, which frequently cross along the surface of the ground." In the "Hortus Indicus Malabaricus," by Henry Van Rheede, published in 1628, the author states that the Palm diffuses its root-fibres widely in a transverse direction. With regard to the interpretation of the verse of Psalm xcii., where the righteous are compared to the vigour of the Palm-tree, it would be presumptuous in me, as a layman, to offer an opinion or discuss it in a theological point of view. Canon Tristram, in his "Natural History of the Bible," alludes to the 12th verse of the above Psalm: "Here the life of the righteous may be compared to the Palm-tree for many reasons. It flourishes in a barren soil; it requires constant moisture; it is a lofty tree, a straight tree; it is always growing so long as it lives, and it is always green, and always bears fruit as far as possible from earth, and as near as possible to heaven. We may add, too, the elasticity and upward growth of its fibre, even when loaded with weight." The following is extracted from Mr. Hooker's translation of Le Maout et Decaisne:—"Palms, perennial woody plants, elegant or majestic in habit. Primary root decaying early and replaced by numerous adventitious roots, which are developed at the base of the trunk, and form a compact conical mass, often very voluminous and rising more or less above the soil, and in certain cases raising the trunk and supporting it like the shrouds of a ship." The Palm-trees with which I was most familiar in India were the Cocoa-nut and Date. Neither had tap-roots. Professor Bentley, in his "Manual of Botany," writes: "The true or primary root, from its being formed by a direct elongation of the radicle, generally continues to grow downwards for some time at least, and hence forms a main trunk or axis from which the branches are given off. Such a root is termed a tap-root, and may be commonly observed in dicotyledonous plants. On the contrary, the roots of monocotyledonous and acotyledonous plants, which are adventitious, are usually of nearly equal size, and given off in variable numbers from the radicle." The above remarks will, I think, show that the palms do not possess tap-roots.—*John Colebrook.*

ROOTS OF PALM-TREE.—There are several kinds of trees called Palm, and the first question to be settled should be, Which is the Palm-tree of the Bible? Many are of opinion that it is the *Phoenix dactylifera*, or Date-palm, which affords food to both man and animals; and I will, therefore, give you a short description of the Palm met with by Bonar in the desert of Sinai. He says: "The roots

are unlike any other tree-roots we had seen, and peculiarly fitted to absorb every drop of moisture that the sand contains. In general form and structure they put us in mind of the Dahlia and Ranunculus, consisting of long fleshy strings or ropes, shooting straight down into the soil in numbers quite beyond our reckoning, and extending over a large circle, whose width we could not ascertain." Again, the same writer observes: "What an apparatus for drawing up the moisture of the desert." The roots of all the *Palmaceæ* are described as fibrous; no matter what the form may be, or the size of the stem, it is invariably woody, and the roots fibrous. This is the sum and substance of all I have been able to call to mind as having read of the Palm-tree; but many who are better versed in the matter will reply to "A. B.'s" question.—*Helen E. Watney.*

CAT AND RABBITS.—A curious case of the adoption by a cat of some rabbits has come under my notice. The mother of the rabbits died, and the kittens having been destroyed, the cat suckled the rabbits and brought them up. This occurred in a small village in Surrey. May not this throw some light on the story of Romulus and Remus being suckled by a wolf, supposed by historical research to be fabulous?—*H. P. Barclay.*

EGG DRILLS.—Beta will be able to obtain the instruments described in my article on collecting birds' eggs, of Mr. J. Everard, surgical instrument maker, 34, Berners-street, W.—*T. Southwell.*

MARSH TIT.—In answer to "C. C.'s" question (SCIENCE-GOSSIP, page 234) "as to whether the curious note, resembling the whetting of a saw, belongs to the Marsh Tit," it is certainly not the Marsh Tit, *Parus palustris*, because that peculiar note is heard in situations where the Marsh Tit is not found. We believe the note to belong to the Great Tit, *Parus major*. The song is heard as early as January, often from the top of a high tree. The bird is very remarkable from the similarity of the simple note to the sound made in filing a saw. Hence, in Staffordshire, the bird is commonly called "Saw-whetter."—*Elizabeth Edwards.*

MIGRATING BIRDS.—Last Sunday I heard, about eight o'clock p.m. the whistling of innumerable birds, passing over Northallerton in a south-westerly direction. I presume them to have been a flock of plovers. They continued to pass over until eleven o'clock. Are these birds regular migrators, or does the present case betoken the approach of a severe winter?—*J. A. Wheldon.*

SEA ANEMONES.—"C. E. R." will be glad to learn that I kept two of *Bunodes gemmacea* for the greater part of a year, and might have done so for a longer period, as they were still in first-rate condition when the accident occurred which caused their death. I kept them in a glass bottle of about six inches diameter, with a loosely-fitting stopper always on, and they were fed twice a week with bits of shrimp, such as one buys at the fishmonger's. I find that small and delicate sorts do well in these bottles; the glass stopper prevents evaporation. Small plants appear quickly all over the sides, and altogether they are the most self-compensating aquaria which I know. I have kept them for long periods without diminution of the contents, and consequently without having the water more dense than at first. Will "C. E. R." be good enough to describe his treatment of *Tealia crassicornis*? I have read, and have been told on good authority, that it is impossible to keep it. My attempts have always failed; but, owing to circum-

stances, I have been unable to obtain one of which I could say with certainty that the base had not been injured.—*W. G. H. C., Frome.*

ZOOLOGICAL NOTES.—There was shot on the Tees on the 30th September a female Great Northern Diver (*Colymbus arcticus*), also a Stormy Petrel (*Pterodroma pelagica*). Two swans were also shot, and are now in the hands of Mr. Richardson, of this town, for preservation. During the last fortnight large flocks of Wild Duck, Teal, Widgeon, &c., have been passing on their autumnal migration; several large flocks of geese have been seen passing over the Cleveland Hills. A Death's-head Moth was also captured at the end of September.—*George Simpson, Middlesbro', October 6th.*

THE SONG THRUSH AND BLACKBIRD PAIRING.—In confirmation of Mr. Robert Holland's article in SCIENCE-GOSSIP of June, on "Remarkable Nests," it might be well to insert the following well-authenticated instance. In the island of Howth my daughter saw a cock blackbird sitting on a nest where previously a hen thrush had been sitting. There were young ones in the nest, which was *not lined*. There can be no doubt as to identity, as it was remarked by others.—*S. A. Brenan, Clk., Allan Rock, Co. Tyrone.*

SONGS OF BIRDS, &c.—A work on the songs of birds and other animals as related to human music, and as furnishing a basis for a theory of melody, has occupied me two years. The chief impediment is the lack of received observations. I should be most grateful if you kindly assist me in any of these ways, viz.:—1. Reference to books, &c., containing songs of birds or other animals in musical notation. (Copies of these would be still more valuable.) 2. Results of your observations on bird or other songs. 3. Is there noticed with any frequency in these songs the occurrence of any fundamental intervals of human music,—as the octave, fifth, fourth, and third? 4. (A question only seemingly irrelevant)—If singing in the ears has ever happened to you, have any of the fundamental intervals above mentioned been observed between the minute tones? 5. Any information that may occur to you as bearing on these subjects. All contributions will be acknowledged, and the results sent to you on publication.—916, Washington Street, San Francisco, Cal.

PARASITES ON BIRDS.—Are there any means of destroying the parasites on fantail pigeons? The fantails are kept in a large open room at the top of the house, with the window constantly open, so that they fly in and out at pleasure. The parasite which most infests them is about the eighth of an inch long, dark in colour, very slender in proportion to its length, so that to an ordinary observer it hardly appears to be an insect; there is also another, round in shape, perhaps one-sixteenth of an inch in diameter, and pinky in colour. The birds have fresh water every day for bathing. Is there any danger of the creatures forsaking the bird for the human habitants of the house, as the pigeons are very tame, and perch on head or shoulder? And will the Editor kindly tell Mrs. Geveke if there is any sensible reason why pigeon feathers should not be used for stuffing pillows, &c.—*M. G.*

PALMS AT SHANGHAI (page 178).—Your correspondent, Mr. Nelson, calls attention to the fact of Palms enduring frost and snow at Shanghai with impunity. Judging from the short and negative description which he gives, viz., that they are *not* "as

graceful as the lofty Cocoa-nut trees of Ceylon, or the Sago-palm of Borneo," I am inclined to think that the species to which he alludes is Fortune's Chamærops, which is an inhabitant of the cooler portions of China, and one or two specimens of which might be seen, a few years ago, growing in the open air at Kew. But the general question of acclimatization is one well deserving the attention of botanists and florists. If all plants that are uninjured by frost or snow in their own country could be guaranteed to be equally hardy in England, the matter of acclimatization would be very simple. Our shrubberies, and heaths, and hedgerows would be enlivened with many a bright gem from Canada, Switzerland, and the mountainous portions of hotter lands. I have lately returned from a sojourn in Tasmania, and there, every winter, the lovely Fern-trees, which abound in the mountain gullies, are weighed down with snow; and quaint Gums (*Eucalypti*) and feathery Wattles (*Acacia*) flourish in a temperature rivalling in coolness that found in many parts of England. But nothing is more certain than that neither Fern-tree, Gum, nor Wattle will exist in Great Britain, except in one or two favoured situations. The reason of this apparent paradox is not far to seek. The incapability of these foreigners to bear the severity of an English winter is simply due to the difference between their respective summers. In the countries named, during the summer months, there is an almost continuous outpouring of the sun's actinic rays, thoroughly ripening the wood, and giving life and vigour to the contained fluids, while, at the same time, the atmosphere is comparatively dry, and the air is not eternally loaded with superabundant moisture. We all know how different from this is the normal condition of the English summer. We certainly get the advantage in the greenness of our meadows and the fresh appearance of our vegetation, aspects for the most part unknown in the countries alluded to; but the incessant humidity, and the general absence of sunlight, are fatal to the well-being of plants which in other lands, thanks to the summer solar ray, can defy the frost and snow of winter. A very careful selection might add a few foreign names to our native species; but before Palms and Fern-trees grace our landscapes, the theory of "heredity" must be worked out patiently and slowly, and then possibly the "survival of the fittest" may take place.—*IV. W. Spicer.*

CLAMS.—I have tasted clam soup in America. It is somewhat like oyster soup, but I believe it is made, not from the giant-clam, *Clama gigas*, but from the soft clam of the northern shores, the *Mya arenaria*, which is very much used in America as an article of food. It is found in great abundance on the coast of New England, and makes good bait in cod and haddock fishing. The shells are dug up from thin beds at low water. They are found a foot or so deep below the surface, their siphon-tube projecting upward in the hole by which they communicate with the water at high tide. They are "shucked," that is taken out of their shells, and salted for the fisheries. As many as five thousand barrels a season are thus consigned. Clams are often mentioned in the early history of the Plymouth colony; and judging from scalloped clams, roasted clams, and clam soup, I have no doubt but what Mr. W. A. Cairns will find preserved clams very fair eating for persons who rejoice in a good digestion.—*H. E. Watney.*

A MYSTERIOUS GIFT.—An account of the first ascent of the Peter Botte Mountain is given in the

Penny Magazine for 1833, which is probably the one referred to by your correspondent, Alfred Paterson.—*Charles Madely.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

M. (Bradford).—You will find instructions as to preparing such skeletons as you require in the chapter on "Bones," in "Collecting and Preserving Natural History Objects," published by Hardwicke & Bogue, price 3s. 6d.

C. A. COWLEY.—Your specimen is the beautiful and rare *Astrantia major*, found in Shropshire. See articles on it at page 8 of SCIENCE-GOSSIP, vol. for 1873.

M. J. WILDE.—No rock specimens, such as described in your letter, have yet reached us.

O. P., Cambridge.—The Agaric is evidently a very young state of *Agaricus (Mycena) polygrammus*. Fr. M. C. C.

DAVID SCOTT.—Your plants are: 1. *Anthemis nobilis*; 2. *Cardamine amara*; 3. *Parnassia palustris*; and 4. *Saxifraga stellaris*.

YOUNG MUSCOLOGIST.—Get Hobkirk's "Synopsis of British Mosses," price 10s. 6d., published by Lovell Reeve.

A. BERNARD.—The curious monstrosity of the stems of the *Malva moschata* (which we are much obliged to you for sending us) is described by Dr. Masters in his "Vegetable Teratology" by the name of *fasciculation*. It is caused by the abnormal growing together of branches, just as the normal substance we call "horn" is due to the agglutination of hairs.

J. SIMS.—Of course we are obliged to trust to the honour of those who use our exchange column, and we cannot be expected to guarantee good faith. We shall always feel obliged if "exchangers" will notify to us any breach of faith. We shall then take good care to exclude the offenders from the future.

A YOUNG GEOLOGIST.—Your fossils are:—1. *Pectuncululus glycymeris* (young specimen); 2. Fragment of *Natica*; 3. *Purpura lapillus*. The crystals are selenite, or sulphate of lime, derived from the London clay. See chapter in Taylor's "Geological Stories," entitled "Story of the Crags."

J. K. (Yarmouth).—Trimmer's "Flora of Norfolk" is a well-known and highly esteemed work. (2) We have not heard of any recent numbers of Donkin's "British Diatomaceæ" being issued; nor can we guess the cause of the delay, unless it be the author's professional engagements. Your plants are named correctly in the parcel sent us.

J. KIRBY.—You may get the materials mentioned in Dr. Woodward's process for staining muscular tissues from any first-rate chemist.

W. J. R.—Write to Mr. Van Voorst, publisher, who has (we believe) published lists for labelling, such as you require.

J. ANDERSON, jun.—The Fuchsia with the calyx segment transformed into a green veined leaf is very curious, and very instructive as an illustration of reversion.

J. W. N.—The slide contains elytra, &c. of the female of the common water-beetle (*Dytiscus marginalis*). The female is so unlike the male in appearance that it was formerly regarded as a different species.

A. WHELDON.—Thanks for your monstrosity of *Plantago lanceolatum*, showing three heads on one stalk.

K. D.—Will you kindly send us your query again, as we have mislaid it.

G. R. REDGRAVE.—The malformed rose with mass of petals arranged around the stem beneath the main mass is a case of what Dr. Masters terms "mediate proliferation." See his masterly work on "Vegetable Teratology."

GREGORIUS and A. G. WRIGHT.—See article on "Preserving Fungi," by Mr. Worthington Smith, the eminent fungologist, in "Collecting and Preserving Natural History Objects."

T. WATSON (Burnley).—Your best plan would be to offer the instrument for exchange in our "exchange" column. Or advertise it for sale in the magazines you name. There are none better.

A SUBSCRIBER.—Your grapes are attacked by the usual vine disease, which is a fungus. For its treatment consult any work on grape-culture.

H. W. S.—We like the paper, and shall insert it at our earliest opportunity.

F. W. HYTCH.—There is a "Postal Microscopical Club" established, of whose rules, &c. you will find a full account in SCIENCE-GOSSIP, vol. for 1873.

W. GAIN.—From the description of your larva we conclude it is that of the goat-moth (*Cossus ligniperda*), but we cannot judge definitely without seeing it. Leave it where it is.

F. ALEXANDER.—Your larvæ of *Jacobæa* will hibernæ. Benzine may be used in stuffing moths; and a little fine chalk or fillers' earth mixed with the wool, to absorb the natural grease. You will find a good description of *Filipendula* in Hooker's "Student's Flora of the British Islands."

LYMNEA INVOLUTA.—We should feel obliged if some of our correspondents in the Killarney or other districts would supply us with a few living specimens of this mollusk. The sooner the better.

J. SINEL.—The parasitic insect of which you sent us a sketch is named *Gamasus coleopterorum*.

A. C.—Your moth was a specimen of *N. rhomboidea*, whose wings had been aborted. It reached us alive, but the wings never fully developed.

L. S.—The objects on surface of the leaf are not due to any parasitical disease, but are caused by an insect, a species of *Cynips*, which punctures the skin.

"CONSTANT SUBSCRIBERS."—We wish our correspondents would adopt some other *nom de plume*. We have several this month, and are in a complete quandary as to which is which. To one who writes under this name we beg to say that no plant was enclosed.

EXCHANGES.

MICROSCOPICAL cabinet for exchange, capable of holding 1,920 slides lying flat; mahogany and deal, value £4; for further particulars write to Wm. J. Fuller, Corve Lodge, Greenway-road, Redland, Bristol.

WANTED, vol. ii. of "Coloured Illustrations of British Birds and their Eggs," by H. L. Meyer (1842).—Jos. Sinel, Bagot, Jersey.

FOR unmounted pieces of skin showing scales from the back and belly of Lizard, send object of interest to G. Moore, 12, Porchester-street, near Clifford-street, Birmingham.

OFFERED, Turton's "British Shells, Land and Freshwater." in exchange for any other Book of equal value, Fossils, or any Natural History Objects.—Address, T. C. Maggs, Yeovil.

OFFERED, 84 numbers "Nature," 2 vols. "Popular Science Review," Hogg "On the Microscope," Latourneau's "Biology," and "Withering's" "Botany." Wanted, vols. 3, 4, and 5 of Jeffrey's "British Conchology," or back numbers of "Zoologist and Naturalist" prior to 1878.—J. D. Butterell, 26, Colman-street, Hull.

FOR cleaned Foraminifera from Ireland send good Slide or Material, not polariscope, to A. Alletsee, 11, Foley-street, London, W.

SEVERAL pairs of Cowries (*C. caput serpentis*) for exchange for Shells, &c.—Mrs. Skilton, London-road, Brentford, Middlesex.

FOR Cuticle of Indian Corn (*Zea Mays*) send a stamped directed envelope to W. H. Gomm, Sandwich, Kent.

RARE British Plants dried, for Lepidoptera, Birds' Eggs, or Shells.—L. R. H., 4, Ellesmere-villas, Devonshire-road, Forest-hill.

OFFERED, Nos. 246, 1280, 1381, 1403, 1479, 1505, and many others, for Nos. 187, 325, 500, 518, 615, 626, 676, 728, 762, 823, 085, 997, 1299, 1309, 1471, 1622.—E. D. C., 25, Oxford-road, Kilburn, London.

FOR leaf of *Dentzia scabra* unmounted, send stamped envelope or other microscopic object to M., 3, Belmont Villas, New Brompton, Kent.

FOR injected Human Kidney, injected Human Intestine, stained Human Intestine, and Japanese Grass, all in balsam, send pure gatherings of diatoms or any well-mounted balsam slides to J. A. Käy, Mansion-house, Brompton, Chatham.

I HAVE Cassell's History of the Franco-Prussian War (complete, weekly numbers, unbound). Required micro slides.—W. H. Skan, 15, Brownlow-street, London, W.C.

I HAVE five numbers (one more completes the work) of Twining's "Science Made Easy," illustrated, Hardwicke & Co., quite new and cost 5s. Should be glad to exchange them for British Lepidoptera, side-blown eggs, or tolerably recent numbers of "The Entomologist," "SCIENCE-GOSSIP," or "Zoologist," bound or unbound.—W. Barrett Roué, 165, White-Ladies-road, Bristol.

A FEW Adders, preserved in spirits of wine, in exchange for rare Plants, Mosses, Lepidoptera, Shells, Fossils, or others.—R. Renton, Fans, Earlsdon, N.B.

L. C., 7th edition, Nos. 84, 104, 135, 146, 176, 184, 237, 253, 363, 527, 611, 682, 683, 704, 767, 769, 831, 838, 856, 858, 864, 882, 913, 929, 971, 979, 988, 1000, 1001, 1130, 1334, 1485, 1519, 1539, and many others, in exchange for other rare British Plants. Send full list of duplicates to J. Temper, 12, Cecil-street, Moss-side, Rusholme, Manchester.

BEAUTIFULLY mounted Slides (crystals) for the polariscope in exchange for objects of interest, mounted or unmounted.—A. Smith, Essex-road, Islington.

LONDON CATALOGUE, 7th ed. offered, 2, 39, 47, 79, 267, 277, 394, 591, 831, 858, 974, 1014, 1036, 1284, 1310, 1504, and 1650, in exchange for other rare British plants.—W. Jones, 32, Manchester-street, Oldham.

Sphaerotheca castagnei on Hop offered for foreign Marine Algæ.—E. C. J., Monson Nursery, Red Hill, Surrey.

FIRST-CLASS Slides given for good material, Foraminiferous, &c., in quantity, either prepared or in the rough.—James Green, March.

L. C., 7th edition, Nos. 38, 273b, 534, 809, and others, including many from the Lake District, for 183, 553, 588, 590, and others. Lists exchanged.—A. W. Preston, 49, Cheltenham-street, Barrow-in-Furness.

RARE British Vertigos. Correct and well-authenticated (duplicate) specimens of *Vertigo antivertigo*, *pusilla*, *minutissima*, *alpestris*, *striatata*, and *angustior*, offered in exchange for really good and correct Foreign Shells—land preferred to marine. Also offered, *Lymnaea involuta*, *Succinea oblonga*. Wanted, *Lymnaea Burwellii*, *Ame. lineata*.—W. Sutton, Upper Claremont, Newcastle-on-Tyne.

FOR exchange, an Herbarium of British Phanerogamous Plants, containing over 600 species, many rare, in good condition. Offers requested, list will be forwarded.—A. Macindoe, Maryhill, Glasgow.

OFFERED, *Helix revelata*, *Clausilia biplicata*, *Planorbis lineatus*, &c. &c., and many British marine. Wanted, British Vertigos and Northern marine species.—A. H. Cooke, King's College, Cambridge.

FOR pieces of Chinese Rice-paper (pith of tree) mounted send well-mounted object to Thos. Shipton, Chesterfield. Lists exchanged.

BIRDS' Eggs, side-blown, well-marked, labelled, picked specimens; also beautiful specimens of British Butterflies and Moths, well set; also British Coleoptera, splendidly set, new style. Lists free. Exchange side-blown eggs new to collection. Foreign correspondence solicited.—Henry Sissons, Westbourne-road, Sheffield.

SEVERAL packets of Diatomaceous Earth for exchange for mounted sections of Coniferous wood (three packets) for good slide. Wanted also the Club Mosses and Selaginelli. Fossil Polyzoa in exchange.—G. R. Vine, Attercliffe, Sheffield.

FOR piece of Sea-mat (*Flnstra truncata*) send stamped directed envelope. Also for portion of lung of White Whale (*Beluga leucas*) or two or three embryo cuttlefish (*Sepia officinalis*) send well-mounted object to E. M., 20, Crossley-street, New North-road, London.

SEVERAL immense living Chrysalides of *Acherontia Atropos* offered in exchange for good Natural History Slides or microscopical accessories.—W. Lane Near, Margate, Kent.

SIDE-BLOWN Birds' Eggs and Skins. Will exchange about 200 varieties, guaranteed true typical specimens, richly marked; dates and localities supplied. Lists exchanged.—John William Sissons, 11, Priory-road, Sheffield.

WANTED to exchange, Mounted Objects, principally photographs, for good mounted objects.—E. Atkins, Chemist, 200, Essex-road.

To exchange, a quantity of Diatomaceous Earth for mounted objects or anything of interest. Stamp for reply.—A. Smith, 198, Essex-road.

WANTED, varieties of *Succinea* (especially *S. putris*, var. *vitreæ*) and other species. Good exchange given.—Mr. Marshall, 1, Portland-cottages, Portland-place North, Clapham, London.

BOOKS, &c., RECEIVED.

"English Folk-Lore." By the Rev. T. F. Thistleton Dyer, M.A. London: Hardwicke & Bogue.

"Pleasant Days in Pleasant Places." By Edward Walford, M.A. London: Hardwicke & Bogue.

"Annual Report of the U.S. Entomological Commission on the Rocky Mountain Locust, 1877." Washington: Government Printing Office.

"Section Cutting." By D. Sylvester Marsh. London: J. & A. Churchill.

"Popular Science Review." October.

"Land and Water." "

"Journal of Applied Science." "

"Chambers's Journal." "

"Feuille des Jeunes Naturalistes." "

"Midland Naturalist." "

"The Scottish Naturalist." "

Various Pamphlets.

&c. &c. &c.

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



QUARTZ, AS IT OCCURS IN THE LAKE DISTRICT: ITS STRUCTURE AND ITS HISTORY.

PART III.

By J. CLIFTON WARD, F.G.S., F.R.M.S., &c.



FEW years ago, being anxious to apply Mr. Sorby's method to the granites and granitoid rocks of the lake-country, I examined a number of slices of the granite rocks, and measured nearly five hundred cases of liquid-cavities, ascertaining the relative

size of the vacuity (or bubble) to the liquid-cavity. My method of proceeding I will describe directly, but I will at once state that the result arrived at in the case of the Skiddaw granite, for example, was, that its consolidation took place under a pressure of rather more than an equivalent of 51,000 ft. of rock, and that the *mean* pressure under which all the principal granitic and granitoid rocks were consolidated was equivalent to that of 44,000 ft. of rock.

My experiences in the course of this investigation may be of interest to some who wish to undertake original work of a similar kind. (For the Memoir containing the investigation as a whole see *Quarterly Journal of the Geological Society*, vol. xxxi., p. 568.)

The object-glass generally used was a $\frac{1}{4}$ -in. (of Collins), with a C eye-piece, the combination magnifying 665 times. When I first began my measurements I used a neutral-tint glass reflector, and traced on paper all the best-defined fluid-cavities, making a note by the side of those in which the vacuities showed a constant spontaneous movement. I soon found, however, that on a comparison of a considerable number of drawings, the fixed bubbles were almost invariably relatively larger than those which showed this free movement. Hence I was led altogether to reject from my measurements all cases in which the bubble was fixed, and in which it would seem either that gas had been primarily entrapped,

No. 168.

or that in the making of the thin slice leakage had occurred in the cavity. This last case must necessarily often occur in the making of thin slices, especially as the liquid-bearing cavities are frequently so irregular in shape and prolonged into horns and fine points. I then gave up tracing the outlines of cavities on paper, and measured the relative size of bubble and liquid-cavity directly by means of a Jackson's micrometer, with divisions equal to $\frac{1}{10000}$ th of an inch. This micrometer being placed in the eye-piece, the fine divisions could be brought over the bubble and liquid-cavity, and their relative size at once estimated with tolerable accuracy. But a little consideration will make it evident that measurement of a liquid-cavity in one plane would be of little use unless the cavity be exceedingly shallow and lie along that plane. Hence it became necessary to take this further precaution, viz., to rely only upon the measurements of those cases in which the tiny bubble (or vacuity) moved freely into all parts of the liquid-cavity without going out of focus; this would imply that the cavity was of tolerably uniform depth, but little more than the depth of the diameter of the bubble. And it was found that, when I restricted my measurements to these cases, there was a fairly-marked uniformity in the ratio between vacuities and liquid-cavities occurring in the quartz of the same rock.

Thus, take as an example two different rock-slices of the same granite :—

No. 1.	$\left. \begin{array}{l} \cdot 154 \\ \cdot 154 \\ \cdot 154 \\ \cdot 166 \\ \cdot 180 \\ \cdot 180 \\ \cdot 154 \\ \cdot 154 \end{array} \right\} \cdot 162.$	No. 2.	$\left. \begin{array}{l} \cdot 166 \\ \cdot 125 \\ \cdot 166 \\ \cdot 180 \\ \cdot 200 \\ \cdot 166 \\ \cdot 166 \\ \cdot 166 \\ \cdot 154 \\ \cdot 166 \\ \cdot 142 \\ \cdot 142 \end{array} \right\} \cdot 164.$
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In No. 1 there are five cases in which the whole liquid-cavity is $6\frac{1}{2}$ times the size of the vacuity, one case in which it is six times the size, and two cases in which it is only $5\frac{1}{2}$ times. The mean '162 is probably not far from the truth.

It may be difficult to realize the size of these liquid-cavities and their contained bubbles. Those reliable for measurement are extremely small, sometimes less than $\frac{1}{10000}$ th of an inch in diameter. Much larger cavities generally occur in plenty; but these seldom exceed the $\frac{1}{2000}$ th of an inch in length, and in them the bubbles either have no movement, or but a very slight or sluggish one. In fact, such is the minuteness of these cavities and their number, in many cases, that more than a thousand million might be contained easily within a cubic inch of quartz, and sometimes the contained water must make up at least 5 per cent. of the volume of the containing quartz. In some cases the liquid-cavities are much arranged along lines, as in the quartz crystals occurring in the Armboth Dyke. Occasionally, however, liquid-cavities are met with in quartz crystals of very considerable size, such that the movement of the bubble can even be recognized by the naked eye. Having accumulated a sufficient number of reliable measurements, and struck the mean for any one rock, such as the Skiddaw granite, the calculation of the pressure under which the granite was formed is proceeded upon by mathematical formulæ furnished by Mr. Sorby's investigations, the temperature of a dull red heat visible in the dark (680° F.) being assumed as the probable temperature of consolidation. The result, in the case of the Skiddaw granite, is that a pressure equivalent to 52,000 ft. of rock must have been necessary to compress the liquid so that it would fill the cavities at a temperature of dull red heat.

The next question bearing upon this result is one for the field-geologist alone to determine. What is the greatest thickness of rock which can have been removed from over the mass of the Skiddaw granite as we now see it exposed? Geological investigation of the whole district leads me to infer that at one time the granite must have been covered by some 30,000 feet of rock—including Skiddaw slates, volcanic series, and Upper Silurians. But we have seen that the calculated pressure is equivalent to 52,000 ft., hence the pressure to which the consolidating granite (and therefore quartz) was subject was greater than what could be due to the mere weight of overlying rocks. How, then, was this pressure applied? We have seen that the condensed liquid confined within the quartz has remained as a registering thermometer, to show the existence and amount of the pressure, and geological examination of the district further informs us that the overlying 30,000 ft. of rock was in some way elevated and contorted,—being also slowly removed by denudation. Thus we have physical evidence, from two different sources, of the existence of great pressure exerted upon the granite-

forming mass; evidence derived from the liquid-cavities and their contained bubbles, and evidence in the rocks overlying the granite of such pressure having produced elevation, contortion, cleavage, and general metamorphism. It is further interesting to notice what would be the probable heat at a depth of 30,000 ft. according to our estimates of known increase on descending through the crust of our globe. If we take that increase as 1° F. for every 49 ft. (Mr. R. W. Fox, *Brit. Assoc. Report*, 1857, p. 91), we find that at a depth of 30,900 ft. the temperature would be 360° C. (680° F.), or that of a dull red heat visible in the dark, and just the temperature at which we were supposing the granite was formed. Thus, to sum up our results in the case of the Skiddaw granite:—

1st. It is probable from geological evidence that this granite was consolidated at a depth of about 30,000 ft.

2nd. An increase of 1° for every 49 ft. on descending gives a temperature of 360° C. (680° F.) at a depth of 30,900 ft.

3rd. Microscopic evidence, deduced from examination of the liquid-cavities in the quartz, gives a calculated pressure under which the quartz was consolidated at a temperature of 360° C. (680° F.), equivalent to 52,000 ft. of rock.

4th. As the calculated pressure thus far exceeds (by 22,000 ft.) that due to the estimated thickness of overlying beds, or, what is the same thing, to the estimated depth at which the granite formation took place, it follows that there must have been a great amount of available pressure to be exerted upon the rocky crust around, and hence we find evidences of folding and contortion of the rocks, and of their upheaval and general metamorphism around the granitic area.

The case of the Skiddaw granite will suffice as an example of this mode of treatment. I have elsewhere (*Quart. Journ. Geol. Soc.*, vol. xxxi., p. 568) treated all the other granitoid rocks of the Lake District in the same way, and with very similar general results. There are yet, however, one or two points I should like to call attention to.

The first of these is the general absence among the liquid-cavities in the quartz of Lake District rocks of crystals of various salts, such as have been found in plenty in some other districts. Are we to infer from this that the liquid enclosed at the period of the formation of the granites was less saline than in some other cases? Or is it possible that a more extended investigation would make it appear otherwise? Another thing worth noting is the general absence, as far as I have been able to judge, of cavities in the quartz containing, not water, but liquid carbonic acid, which in some other rocks and other districts are not infrequent.

While thus calling attention to various points connected with the formation of quartz-bearing rocks of

the district, I am far from claiming to have examined into the question exhaustively, and would gladly see other workers take up the subject more completely, and either prove or disprove the results already obtained.

It is evident that microscopic examination throws light not only upon the origin of such quartz-bearing rocks as granite, but also upon that of quartz as an accidental and accessory mineral among rocks, and upon the mode of formation of quartz veins. We are, in fact, led to see that heated water containing silica in solution has played a most important part in geological history, that such water has sometimes been diffused through a rocky *magma* at a dull red heat, under enormous pressure, and finally become entrapped in millions of minute cavities in the solidified rock; sometimes it has worked its way up along cracks and fissures, and deposited quartz in those fissures, forming veins; sometimes circulating throughout the mass of a rock, it has deposited the quartz in all irregular cavities or vesicles, at a less degree of temperature; and finally we recognise the same heated water fully charged with silica rising to the surface in the form of the geysers of Iceland, and playing a large part in all volcanic outbursts. Surely there can be few thoughts more surprising than this, that every piece of granite we pick up contains in its quartz particles thousands of minute liquid-cavities, and, moreover, that every such liquid-cavity includes a tiny vacuous bubble in constant tremor or active motion, such motion, it would seem, having been kept up for the countless ages since the granite was first solidified deep down in the bowels of the earth. Truly, we learn great things from study of the most minute.

NATURAL HISTORY IN THE SEVENTEENTH CENTURY.

BY F. KITTON, HON. F.R.M.S., &c.

PART III.

THE first part of the treatise is devoted to hunting-dogs—*Canes Venatici*. "But because we English men make a difference between hunting and fowling, for they are called by these severall words *Venati* and *Aucupium*, so they term the dog who they vse in these sundry games by divers names, as those which serue for the beast are called *Venatici*, the other which are vsed for the fowl are called *Aucupatorij*. The first called *Venatici* I deuide into fīue sorts, the first in perfect smelling, the second in quicke spying, the third in smelling and quickness, the fourth in smelling and nimblenes, the fift in subtility and deceitfulness, herein these fīue sorts excelleth."

The description of each kind of dog is preceded by the derivation of its name, of which we give some examples.

"Of the Dogge called a Terrar, in Latine *Terrarius*.

"Those whom we call Terrars, because they (after

the maner and custom of Ferrets in searching for Connies) creep into the ground, and by that meanes make afraid, nippe, and bite the Foxe and the Badger in such sort that they either teare them in peeces with their teeth, being in the bosom of the earth . . . or at least through conceived feare drive them out of their hollowe harbours, in so much that they are compelled to prepare speedy flight, and being desirous of the next (albeit not the safest refuge), are at leisvre taken and intrapped with snares and nets laide ouer holes to the same purpose.

"Of gentle Dogges seruing the hauke and first of the Spaniell called in Latine *Hispaniolus*.

"The common sort of people call them by one general word, namely Spaniels, as though these kind of dogs came originally and first out of Spaine.

"There is also at this day among vs a new kinde of Dog brought out of France (for we Englishmen are marueilous greedy gaping gluttons after nouelties and couetous cormarants of things that be seldome, rare, strange, and hard to get.) And they be speckled al ouer with white and black, which mingled coulours incline to a marble bleu, which beautifieth their skins and affordeth a seemely show of comliness. These are French dogs, as is aboue declared already."

The treatise concludes with remarks on the diseases of dogs and their remedies, of which one specimen will suffice.

"If a dog grow lean, and not through want of meat, it is good to fill him, twice or thrice with Butter; and if that does not recouer him, then it is a signe that the worme vnder his tongue annoieth him (which must be presently pulled out by some Naule or Needle), & if that satisfie not, he cannot liue, but will in a short time perish. . . . Dogs are also many times bewitched by the onely sight of inchanters, euen as infants, Lambes, and other creatures, according to Virgils verse—

Nescio quis teneros oculus mihi fascinat agnos.

For the bewitching spirit entereth by the eie into the hart of the party bewitched: for remedy whereof they hang about the neck a chain of corall, as for holy hearbs I hold them vnprofitable."

Scepticism is said to be the great fault of scientific men of the present day. This sin cannot be laid to the charge of the writers on natural history in former times, and least of all to the Rev. E. Topsell; in proof of which we gave a copy of "the true picture of the Lamia."

"This word *Lamia* hath many significations, being taken some-times for a beast of Lybia, sometimes for a fish, and sometimes for a Spectre or apparition of women called Phairies. And from hence some haue ignorantly affirmed that either there were no such beastes at all, or else that it was a compounded monster of a beast and a fish."

Our author quotes a whole host of Greek and Latin writers who had heard of some such monster;

but as their descriptions are very vague, he thinks they have mixed up a good deal of fable with them. To leave, therefore, these fables, and come to the true description of the Lamia, we have in hand :—

“In the foure and thirty chapter of Esay [Isaiah] we do find this beast called Lilith in the Hæbrev, and translated by the aunicients Lamia, which is there threatned to possesse Babell. Likewise in the fourth chapter of the Lamentations, where it is said in our English translation that the Dragons lay forth their breasts. In Hæbrev they are called *Eihannum*, which by the confession of the best interpreters cannot signify Dragons, but sea calues being a general word for strange wild beasts. How be it, the matter being wel examined, it shall appeare that it must needes be this Lamia, because of her great breastes, which are not competible either to the Dragon or Sea calues, so then we will take it for graunted by the testimony of holy Scripture that there is such a beast as this. *Cristotinus Dion* also writeth that there are such beasts in some part of Libia, having a womans face and very beautifull, also very large and comely shapes on their breasts, such as cannot be counterfeited by the art of any painter, hauing a very excellent colour in their fore parts, without wings, and no other voice but hissing like dragons. . . . The hinder parts of this beaste are like unto a Goate, his fore legs like a Beares, his vpper parte to a woman, the body scaled all ouer like a Dragon,* as some have affirmed by the obseruation of their bodies, when *Probus* the Emperour brought them forth in publike spectacle.”

Gesenius in his Commentary⁷ on Isaiah, says : “Lilith is, in the popular belief of the Hebrews, a female spectre in the shape of a finely dressed woman, which in particular lies in wait for and kills children, like the Lamie and Striges of the Romans.”

In his “Anatomy of Melancholy” Burton remarks that “The Talmudists say that Adam had a wife called Lilib before he married Eve, and of her he begat nothing but demons.”

One of the most remarkable animals figured in this veracious history is the Mantichora. “A beast, or rather monster (as Ctesias writeth), is bred among the Indians, hauing a treble row of teeth below and aboue, whose greatnesse, roughnesse, and feete are like a Lyons, his face and eares like vnto a mans, his cies gray and collour red, hiss taile like the taile of a Scorpion of the earth, armed with a sting, casting forth sharp pointed quils, his voice like the voice of a small trumpet or pipe.”

A long chapter is devoted to the Unicorn, in which he discusses the probabilities of the existence of such a beast, “whereof diuers people in every age of the worlde haue made great question.”

The Rev. E. Topsell, however, is quite satisfied of its existence, and he silences his opponents with the following unanswerable arguments :—

“David, in the 92 Psalm, says, ‘My horn shall bee lifted vp like the horn of a Vnicorne,’ whereupon all Divines that ever wrote have not only collected that there is a Vnicorne, but also affirme the similitude to be betwixt the kingdome of Dauid and the horne of the Unicorn, that as the horne of the Unicorn is wholesome to all beasts and creatures, so should the kingdome of *Dauid* be in the generation of Christ. And do we think that *Dauid* would compare the vertue of his kingdom and the redemption of the world unto a thing that is not, or is vncertain and fantastical. The Lord speaketh in this manner to Iob, Will the Vnicorne rest and serue, or tarry beside thy cratches (Mangers, from this word is derived the name of the childs game of scratch cradle, properly cratch cradle or manger-cradle, in allusion to the manger at Bethlehem), canst thou bind the Vnicorne with a halter to thy plough to make furrows, or will he make plaine the clots of the vallies? Likewise the prophecy of Esay, the 34 chap., and in many other places of Scripture, whereby God himselfe must needes be traduced if there be no Vnicorne in the world.”

Among the varieties of sheep described, he includes one of somewhat doubtful existence, viz. the Musmon or Musimon of Latin authors, and which was supposed to be a cross between a ram and a goat. “Pliny makes mention of a beast called Ophion,* and he saith hee found the remembrance of in the Græcian books, but he thinketh that in his time there was none of them to be found in the worlde ; heerein he speaketh like a man that did not knowe GOD, for it is not to be thought that hee which created so many kindes of beasts at the beginning, and conserued of every kind two, male and female, at the generall deluge, would not afterward permit them to be destroyed till the worldes end, nor then neither, for seeing it is apparent by holy scriptures that after the world ended al Creatures and beastes shall remain vpon earth as the monuments of the first six daies worke of Almighty God for the further manifestation of his glory, wisdom, and goodnes, it is unreasonable to imagine that any of them shall perish in general in this world.” If this theory be true, naturalists may reasonably hope to find the Dodo and great Auk still existing.

Many of our readers will, we fear, be inclined to ask the use of rescuing from oblivion the errors and fallacies published centuries ago. From a scientific stand-point the answer must, perhaps, be in the negative ; but may it not be worth our while occasionally to take a retrospective glance, if only to ascertain the progress that has been made? And it ought also to teach us to avoid dogmatizing—one of the greatest faults a scientific mind can be guilty of. Apart from its scientific merits or demerits, this book is of considerable interest to the student of English,

* It is from this description that the artist has evolved the drawing, of which we gave a copy last month, omitting the well developed *ἀνδρῖον αἰδοῖον*.

* This, Topsell says, is identical with the Musmon.

particularly with regard to its orthography. Many peculiarities will be noticed in the extracts we have given; for example, the indifferent use of *v* and *u*; the occasional reduplication of the final consonants in nouns, to which an *e* is sometimes added; the termination *ness*, with only one *s*; and the omission of the ' in the possessive case. Some of the woodcuts are fairly well executed, and occupy a whole page.

The book concludes with an epilogue to the reader, in which he says: "I do require al men of conscience that shall euer read or see these Histoires, or wish for a sight of the residue, to help vs with knowledge, and to certifie their particular experiences in any kinde or any one of the liuing Beastes, and with all to consider how great a task we do vndertake, traouelling for the content and benefit of oter men, and therefore how acceptable it would be vnto vs, and procure euerlasting memorie to themselues, to be helpers, encouragers, ayders, procurers, maintainers, and abettours to such labor and needfull endeouour as was never before enterprized in England. . . . Farewell."

A NEW COLLECTING BOX.

SOME time ago you did me the honour of admitting to your pages illustrations of the "Sear" collecting bottle, which I have reason to know has been useful to many naturalists. I now beg to introduce to them a little contrivance which I have

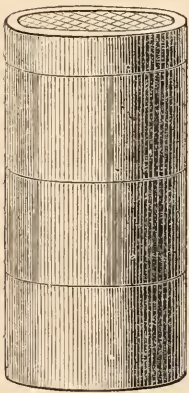


Fig. 221.—New Collecting Box, 2/3 full-size, closed.

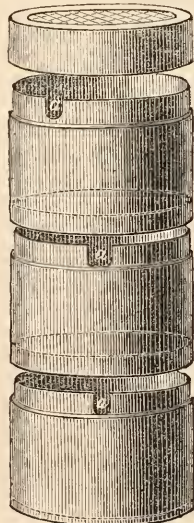


Fig. 222.—Ditto, 2/3 full-size, open.

tested, and found good for practical work, in the form of a light tin collecting box. The annexed sketches are almost self-explanatory. The notches at *a a a* allow the introduction of "small deer" without imperilling the escape of previous captures. The dotted circles show the position of the bottoms of the

boxes, all of which are like the top A, made of fine wire gauze, and thus the specimens are kept separate while air passes freely to all. The collector can open his case hours or even days after his excursion

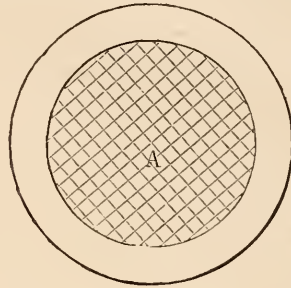


Fig. 223.—Annular Top of ditto, with wire lattice, full size. without the certainty which exists in pill-box captures of finding half his subjects smothered, and the other half destroyed by ferocious companions.

The box is very strong, very light, and inexpensive, and may be obtained of Messrs. Thomas Bentley & Co., of Margate, to whom I have given the pattern. W. LANE SEAR.

A FEW WORDS ABOUT A LITTLE GNAT.

ON the 1st July a friend gave me two ounces of Thames water, which had been drawn from the cistern supplying his house; and this small quantity contained more than thirty worm-shaped creatures, which, upon examination, I found to be the larvæ of some kind of gnat: the largest were about a quarter of an inch long.

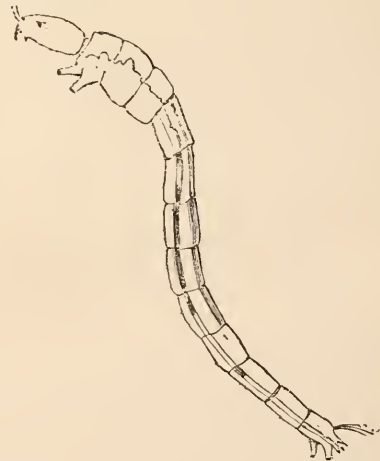


Fig. 224.—Larva of Gnat, natural size 1/4-inch.

The larva of this species has a brown head, with the eyes, mandibles, and a fine line round the neck, dark brown; the thorax and the abdomen pale green. Two prolegs project from the under side of the prothorax, and two from the last segment of the abdomen, which has also, at its extremity, three

appendages, and on the top two pencils of hair, each pencil being supported on a short stalk.

I put my specimens into a small glass vessel. After some hours I found several tubes of cobweb-like texture, open at both ends, and slightly tapering, attached to the sides of it, and in each tube a larva, which, holding on by the anal prolegs, gave to its body a vertical serpentine motion, which made a current of water to flow through the tube. About once a minute it would contract itself, and then, pressing its head against the sides of the tube, collect with its conspicuous mandibles and devour such of those solid particles which had been drawn in by the current and were entangled in the tube, as suited its taste, and occasionally it would turn about and collect at the narrow end, but it always brought its head back to its old position at the larger end before it commenced pumping again.

This larva does not come to the surface of the water to breathe, neither does the pupa, which also lives in a tube, and makes the water flow through it by the undulations of its body, just as the larva did, in order, I presume, to bring the air contained in the water into contact with the hairy fringes which border the segments of its abdomen; certainly not to obtain food, for it does not eat. It has no hairs on the thorax like those represented in the figures of *Chironomus plumosus*.

I was amused to see that each of my pupæ kept its old head under its body, where it rocked to and fro with each wave of its abdomen; there it was, with its dark jaws, its little eyes, and neat brown collar, and with the same comical, Japanese kind of expression that it had when it was in its old place. When the pupæ were about three days old they left their tubes, and after swimming, or rather throwing themselves about with the most violent contortions for three hours or so, and now frequently coming to the surface, they remained there for a little while, and then the transformation took place.

Although I watched my captives pretty closely, many of them changed their state unobserved. Once, when I went away for two minutes only, I found on my return the gnat creeping up the side of the vessel. At last I was fortunate enough to see one come out. It did not free itself in a careful, deliberate manner, like the common gnat, which, sailing about in its pupa skin, gently extracts its anterior legs, and, after carefully placing these on the water, proceeds to liberate the next pair, and so on; but it came forth as though it were being steadily squeezed out, and then immediately flew away, the whole operation occupying just fifteen seconds!

I had previously placed a pupa on the stage of my microscope in order to examine it; but before I had time to do so, the skin parted, the head appeared, and in about eighteen seconds the whole imago was out.

My specimens lived a month as larvæ, and from three to four days as pupæ. I am sorry that I have

been unable to obtain the name of this insect. I think it is allied, if it does not belong, to the genus *Chironomus*. The imago is $1\frac{1}{2}$ line long. The two anterior legs are distant from the others, and the rostrum is short.

The female is yellow, and has short antennæ, of few joints, the terminal one being the largest; the male is darker, with the abdomen greenish-brown; the tibiæ and tarsi dusky; the antennæ plumose, of many moniliform joints, with the terminal one cylindrical, and very long.—*Edward Cox, Brixton.*

A TOUR IN SEARCH OF FOSSILS.

THE experiences of a collector during a run from Edinburgh to Bristol, and a stay of twelve days at the latter place, may, perhaps, be interesting to the readers of SCIENCE-GOSSIP.

The first halting-place was Settle, in Yorkshire, classic ground to the brachiopodist, mainly through the labours of Mr. John Burrow. Mr. Burrow was the son of a doctor of independent means, and spent his life in working out the palæontology of his district. He was known to all of the inhabitants of the town to whom I spoke, and an intelligent shoemaker, who occasionally accompanied him on his rounds, gave me what information he could, as to his habits and excursions. He described him as "rather dull-looking" as a lad, and as one from whose after-life no great things were to be expected. From what I had known of his work I was curious to find out as much as I could about him, wondering, as so much has recently been said of men in a humble grade of life who have worked in pretty much the same groove, what could be said of a man who was above them in the social scale; but I had not time to pursue such inquiries very far; the sum of what I learnt was that he was a man who spent nearly the whole of his time on the moors, that he worked hard, and, uniting quickness of eye and intelligence with zeal, was able to accomplish what he did. Mr. Davidson's monograph of the British Carboniferous Brachiopoda bears frequent testimony to his merits. His collection went to the Woodwardian Museum, at Cambridge, fetching a sum which, as he himself said, paid him scarcely at the rate of a halfpenny per hour for the time during which he had been making it. He died comparatively young.

A collector's first experience of Settle would probably be disappointing. It requires, above all things, time to know what a locality can produce, and a very considerable amount of patience and muscular activity to successfully work a locality that is known. Almost in accordance with my expectation, I found Settle exceedingly barren during the single day I was able to spend there. A few common Brachiopods only rewarded my labour, but these, with the beautiful mineralisation characteristic of the limestone of the district, were thought worthy of preservation. A

few good *Productus striatus* occasionally occurred on window-sills and over porches. Many good things were got when the new line between Settle and Carlisle was being constructed. The quarries scarcely repay a visit to the chance collector. The richer beds are not always worked, and the quarrymen do not seem to have much to offer. Fish remains, I was told, occur in the Dent marbles, a few miles further up the line, but I am not aware of any vertebrate remains having been found in the carboniferous limestones of the immediate vicinity.

The next halting-place was Dudley. The fossils, with which every paleontologist is familiar, are got at two places, the Wren's Nest and the Castle; neither place is far from the town. I spent a day at the Wren's Nest, but hadn't time to visit the Castle. The beds I saw were tilted at a sharp angle, and good weathered fossils are to be found in the *débris* at their base. The beds themselves are so crowded with organic remains that they offer the finest study possible of an important part of the world's ancient life. These remains, however, are not easy to transfer to the collecting-bag, and the geologist must betake himself to the various places where the softer shales have become disintegrated, and have yielded up a part of their fossil contents. His first feeling will be one of disappointment, even here, where he is aware of an enormous profusion of organisms, and, indeed, if his object be merely to secure fine cabinet-specimens, his disappointment will be keen; good trilobites and shells are not easily to be picked up, but if his object be of a more purely scientific kind, especially if he has learnt to feel much interest in the lower forms of animal life, he will not be dissatisfied with his gatherings. Novelties are, of course, not easy to find in a locality so long and often wrought as Dudley; but it appeared to me very probable, from the almost inexhaustible abundance of material to work upon, that something might even yet be obtained, especially in groups that have not yet received their full share of attention, as corals, polyzoa, sponges, &c. A week's good work would probably yield some interesting results. *Atrypa reticularis* seems to be the commonest fossil, and I mention it because I found the mineralisation exceedingly favourable to the preservation of the spires. Out of a handful thrown into acid, a large percentage yielded the desired result. If one is at all anxious to know whence all the good museum specimens have come, and makes inquiry, he finds that there is a band of men who make a business of collecting. They get good fossils still, and an old man, in particular, had quite recently made several valuable finds. It is hopeless to attempt to compete with such men, and the visitor who has thought of getting them for himself had better give up the idea, and make for the nearest dealer's shop. There are two semi-professional dealers at Dudley, a druggist, Mr. Hollier, and a herbalist, Mr. Fletcher. I only saw

a few of Mr. Hollier's things, but Mr. Fletcher obligingly showed me what he had. He has some good trilobites, but seemed unwilling to part with them. I was told that there was a museum at the Mechanics' Institute, but it was too late to see it. The museum which was before it in date has become defunct, and its collection is scattered.

The neighbourhood of Bristol is perhaps as good a one for the palæontologist as any in the kingdom. Several horizons are well represented, and many of the best localities are easily accessible. I began work upon the inferior Oolite at Dundry. To give an idea of the richness of this locality, it may be mentioned that the quarry is exceedingly small, being used simply to obtain road-metal from, but that out of it have come an enormous number of genera and species, of which specimens occur in almost every museum and private cabinet in the country. At the Bristol Museum I counted from this locality 226 species distributed amongst 67 genera, but a complete list of what it has yielded would give a much higher figure. This great abundance of organic remains was a treat to one coming from the comparatively sterile horizons of Mid-Lothian.

The chief excavation is near the top and on the north side of Dundry-hill, close to the main road leading from Bristol to Dundry, and is two or three miles distant from the city. A little way down on the south side is another and smaller quarry, which I found rich in corals and large *Rhynchonellas*. It is of no use visiting the north quarry unless the workmen have been getting out some road-material; this they get in rather large fragments, and for a small fee will allow the visitor to set to work upon them, and gather for himself what he can. In breaking up the blocks for their own purposes, they put aside the better specimens themselves, and generally have some for sale. The sellers of minerals on the Clifton Downs usually have a few Dundry fossils on their stalls, in addition to a great many very beautiful polished carboniferous corals and sponges, which can be bought at a very cheap rate.

The well-known Rhoetic beds of Aust gave me occupation for a day. The fish remains occur on the surface of the *Avicula contorta* shales, and in bluish-grey seams which run irregularly through a coarse, pebbly-looking kind of rock. The beds are exhibited well up on the face of the cliffs, and the collector is dependent upon the crumbling away of the marl beneath for material to work upon. After a high tide with a strong westerly wind is the best time to visit the locality. A good deal of material was strewn about at the time when I was there, and a star-fish and *Ilybodius* remains rewarded my search. To extract good reptilian or fish remains the collector must prepare himself for hard work, as the matrix is very intractable, but with patience, and a heavy hammer and sharp chisel, he will assuredly meet with good success. Ichthyologists have lamented that

so few *Ceratodus* teeth have been obtained in recent years. A partial explanation may be found in the fact of the hard work required to extract them. That the locality is rich in such remains is well known. The Higgins Collection recently acquired by the Bristol Museum is a striking proof of it. Many of the *Ceratodus* teeth of this collection are figured in Mr. Miall's monograph just published. If the visitor at Aust wishes to spare himself trouble, he may sometimes find a few things at one of the cottages in the village. There does not seem to be any well-sustained effort in any quarter at present at extracting the riches of the locality.

At first view the limestones at Clifton seem barren, but a little careful research soon opens up a better prospect. Mr. Emery, a gatekeeper at the Suspension Bridge, obligingly rendered me very material assistance. His knowledge of the carboniferous limestone of his district is both accurate and extensive, and he has made the valuable discovery of seams of Rhoetic in the limestone of the Durdham Downs. The upper shales I found exceedingly fossiliferous, and at no greater distance than the new buildings on the Leigh side there were beds exposed in which fine Brachiopods were abundant. The "Black-rock" quarry, which has yielded such good fish remains, is unfortunately closed. Wishing to examine the carboniferous limestone of the Mendip Hills in Somerset, I found myself, almost by accident, in Burrington Combe, a glen produced apparently by the same causes as those which have hollowed out the gorge of the Cheddar Cliffs, with which it is in line, but on the opposite slope of the hills. This combe is of considerable interest both to the physical geologist and paleontologist. The section exposed is one of very considerable thickness, and the fossil-bearing beds are accessible. Brachiopods, lamellibranchs, gasteropods, and corals were abundant. Good *Psammodus* teeth would reward the diligent collector. A fine one fell to my share. High up on the right-hand side, almost half-way up the combe, I came upon some shales from which the earth had fallen, and was delighted at the display of organic remains. The dip of the beds was about the same as that of Dudley, which I had just seen, and the profusion of extinct life nearly as great. The fossils I observed were chiefly referable to the genera *Chonetes* and *Spirifer*, *S. cuspidata* being quite common. I am not aware that this locality has been much wrought, but it would unquestionably repay any good work spent upon it.

Two days upon the inferior Oolite of Bradford, Wilts, and Minchinhampton, Gloucestershire, concluded the field work of the excursion, and the short time that remained was spent at the Bristol Museum. There is evidence of good work in this museum, especially on the part of the geologists and malacologists. It possesses several very valuable type specimens, and is, on the whole, well arranged for the display of its collections. It has no funds for pur-

chases, and when the Higgins Collection was in the market had to resort to the expedient of a public subscription to secure it, but in spite of this drawback it has done exceedingly well, and has received many valuable donations. The late Mr. Sanders took great interest in it, Mr. Etheridge, paleontologist to the English Geological Survey, and many others, have contributed largely to increase the number and value of its specimens, and the zeal of the gentleman, recently its curator, and now of the Woodwardian Museum at Cambridge, has done much to bring it to its present satisfactory state. It occupies beautiful premises on a good site. The upper hall is devoted to Mineralogy, Paleontology, and recent shells. The fossils are arranged in table-cases, in stratigraphical order, and the light is all that could be wished. A striking feature is the *Ichthyosaurus*, completely extracted from the matrix, and suspended from an iron support. This way of mounting, as novel as instructive, arose out of a mistake. The wrong faces of the blocks were, in some instances, developed, rendering it necessary for the remains to be entirely extracted, if the specimen was not to be spoiled.

The lower hall is devoted to Ethnography and recent Zoology. I was sorry and rather surprised to hear that more use was not made of this part of the Natural History collections. The attendance of students is almost *nil*. No attempt seems to have been yet made by those who have the direction of what biological teaching exists at Bristol, to take advantage of the facilities which the museum offers.

Edinburgh.

T. STOCK.

AN AUTUMN RAMBLE IN EPPING FOREST.

BY DR. DE CRESPIGNY.

PART II.

THE genus *Coprinus* has membranous gills, which become black (with the black spores)* when fully developed, and finally deliquescent. *Coprinus comatus* we gathered in a pasture below the warren. It is a singular-looking fungus, edible, and remarkable for its scaly cuticle: the scales are seen in the figure as tufted and revolute at their ends. In the same pasture grew another and pretty little species called *C. plicatilis*, with plicato-sulcate pileus and small umbone. As it is a good example of this kind of pileus, a figure in illustration is subjoined. A good specimen of the genus *Cortinarius* we gathered in *Inoloma (C.) violaceus*, said by Mr. Worthington Smith to be one of the very best for esculent purposes. *Cortinarius* has been subdivided into six sections; they have all persistent membranous gills and a floccose trama; a veil of arachnoid threads and rust-

* Specimens of the black spore section of *Agaricus* may be found on dung-hills everywhere in *A. (Coprinarius or Pan-olus) separatus*.

coloured spores. When torn or otherwise dissipated, the remains of the veil may be usually discerned as stains upon the bulbous stipe; but the violet tinge upon the stipe is not constant, nor is the pileus violet except when quite young. It is by no means common.

Most of the smaller specimens of fungi, which grew upon leaves or on the ground, were damaged. We made out, however, that the subgenus *Myxanin* is well represented.

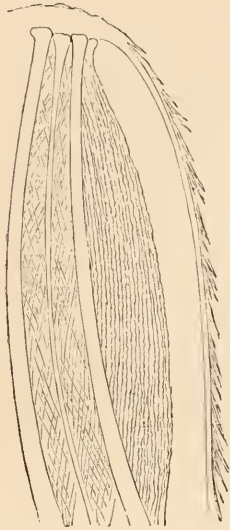


Fig. 225.—Vertical section of *Coprinus comatus*, showing the narrow pileus and scaly cuticle, crowded gills and cavity of the stem filled with filmy reticular tissue, supported by a central columella.



Fig. 226.—Pileus of *Coprinus plicatilis*.



Fig. 227.—Stem of *Marasmius orcadus* covered with a woven villous coat (mag.)



Fig. 228.—Vesicular trama of *Lactarius* and *Russula*.

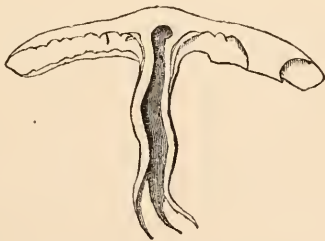
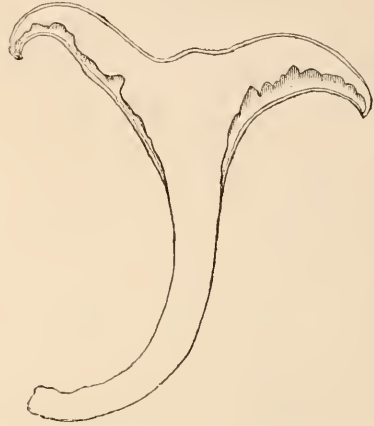


Fig. 229.—Vertical section of *Hygrophorus psittacinus* showing the hollow splitting stipe, &c.

Hygrophorus is characterized by its waxy hymenium, hymenophorum continuous with the stem and descending unchanged into the sharp-edged gills. Specimens of *H. psittacinus* we obtained from a wet pasturage: the colour of pileus, gills, and stem is of a crocus yellow, tinged here and there, on the gills especially, with grass-green in the young plants, the stipes hollow and splitting; the hymenium, too, has a tendency to separate from the trama when dry.

Lactarius is well represented. *L. subdulcis* is extremely plentiful. The gills and flesh are milky in this genus, the trama vesiculose, hymenophorum confluent with the stem; two or three of this species which are of a rufous or cinnamon-brown colour are much alike; the milk of *L. seriffuus*, however, is watery, and that of *L. fuliginosus* turns yellowish. A specimen of *L. blennius*, pileus greenish-grey, gills white, was also gathered.



230.—Vertical section of a *Lactarius*.

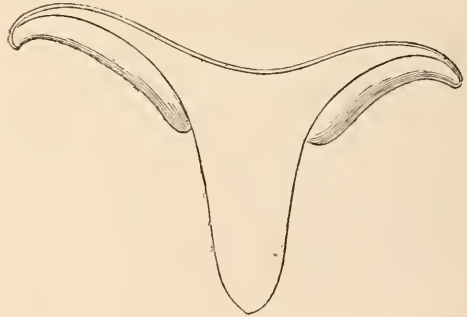


Fig. 231.—Vertical section of *Russula nigricans*.

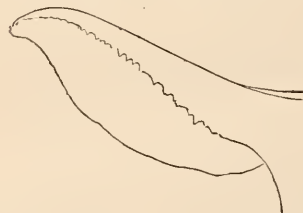


Fig. 232.—Hymenophyllum of a *Russula* confluent with the vesicular trama (*R. heterophylla*).

Equally abundant with *Lactarius* were species of *Russula*. The structural characteristics of this genus are precisely the same as those of the preceding, except that the flesh is not milky. Very common was *Russula heterophylla*, pileus of all shades of dull yellow, greenish, purplish, and dull red; frequent

R. fragilis, red when young, but white and polished afterwards, viscid. Another common species is *Russula nigricans*, dark greyish green or dingy olive, becoming charred as well as the stem, when old; umbilicate, as are the *Russulas* generally, and with the margins of the elevated borders inflected; the gills are white with a black border.

Cantharellus cibarius is sometimes plentiful in Epping Forest. It may be known by its golden-yellow colour, infundibuliform pileus, and gills reduced to mere folds or swollen veins. We could obtain no specimen to illustrate this curious structure of hymenium. The genus has a floccose trama; gills in other species thick, swollen, and obtuse.

Marasmius is another genus in which the trama is floccose; the hymenophorum confluent with the stem, although of different structure; not confined to the lamellæ, but spread over all the interstices. *M. Oreades* is said to be good eating, grows on dry pastures, generally in rings (the circle is rarely complete) of from six to eight feet broad. The whole plant is of a dirty cream-colour, pileus more or less slightly stained with brown, and seldom more than an inch or two in diameter. We found them on a common near Woodford.

Intermediate between the gillbearing Hymenomyces, and those with a porous hymenium, are the two curious genera, *Leucites* and *Dedalea*, both of common occurrence in forests, and of which the former is retained in the first-mentioned family, and *Dedalea* in the latter; but the fact is, when fully developed, it is very difficult, out of a number of specimens, to decide which is which. Nature is very unaccommodating, and refuses to be tied hard and fast by laws and rules, as laid down in the books which treat of her phenomena. The lamellæ of *Dedalea* are indeed sometimes so much broken up, in old plants, as to resemble the toothed processes characteristic of the hymenium of a *Hydnium*.

FOSSIL POLYZOA.

THE GENUS *FENESTELLA*: ITS HISTORY, DEVELOPMENT, AND RANGE IN SPACE AND TIME.

BY GEORGE ROBERT VINE.

History of the Genus.

IN these papers I do not wish to discuss questions that are purely geological. I wish to deal only with one type of a class, out of many of the classes which fall naturally into the divisional roll of the palæontologist. But while keeping this before me as a guide, I cannot ignore the fact that in speaking of formations it will be necessary to either enlarge or restrict my meaning when I use certain terms. In speaking of the Silurian System, this was not so much needed, but in speaking of the *Fenestella* of the

Devonian system it will be necessary to limit my meaning, as my remarks on the species will apply more particularly to the typical Devonian rocks of Devon and Cornwall.

In 1841, Mr. John Phillips published his elaborate work on the Geology of Cornwall, Devon, and West Somersetshire. In this work there are numerous plates of Fossils, with letterpress descriptions of the same. Figures and descriptions are given of these species of *Fenestella*, for in this work Phillips discards the word *Retepora*, and uses Miller's more expressive term. The specific character of *F. laxa* is similar to that given in his Geology of Yorkshire. "The network is extremely large and irregular, the obverse bearing two rows of tubular pores, reverse granulously striated," and the localities are S. Petherwin and Croyde. Of the *F. antiqua* Goldfuss, Phillips gives several very good figures, and his description is little more precise. He says of one of his figures (35a), *F. antiqua* var. that the specimen was sub-conical, and that the celluliferous face was external. This is clearly a mistake, for even from the figure it seems to give an idea that the polyzoon was parasitic on some object. The corallum was irregular, with thick, slightly flexuous interstices, very obtusely carinated; the dissepiments were thick and short, and placed at regular intervals; the fenestrules were oblong, and the pores were small, with slight prominent margins about their own diameter apart, and usually about three to the fenestrule. The species and varieties are common in the Devonian Limestone of Plymouth. This description applies to Goldfuss' figure of *Retepora antiqua*, and not to Lonsdale's *F. antiqua* of the Silurian System. *F. anthritica* is another of the Devonian species, but it is not very well described. The figures are very good, but I cannot make much out of them. The *Hemitrypa oculata* of South Devon seems to me to be clearly a *Fenestella*. It is a thin laminar expansion in a cup-formed mass. The external surface is wholly covered with numerous round pores or cells radiating from a centre, and associated in double rows, which near the centre undergo frequent divisions, so as to form two such rows. The figures seem to bear, in some respect, the character of *Hemitrypa Hibernica*, and also to the *Fenestella* (?) *Sykesii* of De Koninck. One of Phillips's drawings, fig. 38 E., is decidedly characteristic of the *Fenestella* type, and one would have no hesitation in placing it with that group. I have been rather more particular with Phillips's Devonian *Fenestella* than I should have been had the work been less scarce. As it is, I have done my best to furnish the student with his specific characters in this history of the Genus.

Several American Devonian species of *Fenestella* have been figured and described by H. A. Nicholson, Professor of Biology, in his work on "Ontario," and in the Geological Magazine for 1874-5. Some of these new forms are very characteristic, and although they bear

different specific names, there is a tendency of some to ally with Silurian, while others approach Carboniferous species in character. But every fragment given by Nicholson is well described—a property that adds much to the value of his specimens. One of these, *Fenestella magnifica*, bears a close resemblance in its non-poriferous aspect to *F. laxa* of Phillips. To this particular point Nicholson himself draws the attention of the reader. I do not, however, set a very high value upon Phillips' *F. laxa* from the Carboniferous or Devonian series. It is very loosely described, and very loosely figured, both in his Palæozoic Fossils, and in his Geology of Yorkshire. Nicholson's species, then, has this advantage over the older description; it is well figured and well described. The poriferous aspect is unknown. He says: "I have only seen a single specimen of *F. magnifica*, and that only exhibits the reverse side of the conecium, but the general character of the frond so distinctive, that I have no hesitation in founding a distinct species for its reception. It is from the Carboniferous Limestone of Port Colborne, Canada."*

F. marginalis (Nich.) is a very peculiar species. It is described from a mere fragment, but the character is distinct. The polyzoary was fan-shaped, but of unknown dimensions.† In his critical remarks, Nicholson says: "The specimen does not enable me to affirm with certainty that the two marginal rows of cells were separated by a medium keel, but it appears highly probable that this was the case. In the genus, or sub-genus, *Fenestrellina* (D'Orbigny), the mesial keel, separating the two rows of large lateral cells, carries a central row of minute cells. In *F. marginalis*, however, the space between the lateral rows of cells carries a series of minute crowded cells, which are arranged in two, or sometimes in three, alternating rows; so that the central keel, if present, must have exhibited the openings of two or three rows of cells. This character, so far as I am aware, has not hitherto been noticed in any species of *Fenestella*, except *F. rigidula* (M'Coy), and it may, perhaps, afford a ground of sub-generic distinction."‡

Fenestella filiformis (Nicholson) is the most beautiful and delicate *Fenestella* that I have ever seen. It is finer in the branches than the finest and most delicate of any of my Carboniferous species. The specimens are only in fragments, and the celluliferous aspect is unknown. Of the branches, Nicholson says, fifteen or sixteen of these occupy the space of a quarter of an inch.

Another species from the Hamilton group of the Devonians of America is figured and described by

Nicholson, which he dedicates to his friend Davidson. It is the *Fenestella Davidsoni*. From the peculiar growth of the frond, it approaches nearest in character to the *F. Milleri*, of Lonsdale, but both the branches, fenestrules, and number and character of cells are altogether different from that species. "In the general aspect of the celluliferous surface and the sinuous course of the branches, the species makes a close approach to some of the species of the genus *Retepora*; but the presence of non-poriferous dissepiments, and the existence of a keel separating two rows of cells, seem to justify its reference to the genus *Fenestella*."* In his "Ontario," Nicholson gives another species, *F. nervata*, but having no access to his work, I am unable to describe it.

There is a striking peculiarity, however, about the Silurian and the Devonian *Fenestella* when compared with the Carboniferous species, which marks them as distinct. But there are no arbitrary lines about any of the Palæozoic group, except in the *F. rigidula* and *F. marginalis*. If the poriferous character of the keel, or the place the keel should occupy, has not been exaggerated, this is peculiar; but, as I have been myself very much deceived in the apparently poriferous keel,† I merely record my doubt, with all due respect to the describers of these species. Some specimens, too, show this poriferous keel *outwardly*, but when reduced to sections, the real cells are contiguous, and all the keel that exists is the thin, wavy line which separates the two rows of cells, and even this apparent line is nothing more than the impingement of the walls of the separate cells one upon the other.

The *Fenestella* group seems to have reached its climax in the Carboniferous seas. No fewer than twenty-two species have been described by Phillips, M'Coy, and others, to which Mr. Robert Etheridge, jun., has added two others from the Scottish series of Carboniferous shales. Many of these species are fictitious; the characters of some of them have been described from fragments of other species. As, however, my friend G. W. Shrubsole, F.G.S., is engaged on a complete revision of the Carboniferous *Fenestella*, I will just here indicate the specific character of a few only of the list. *F. membranace*, Phillips, is a well-marked and characteristic species. It is elongate and conical, bearing—generally—three small pores on each side of the fenestrule; it has, moreover, long, solid non-poriferous roots. *F. antiqua*, Lonsdale, *Retepora antiqua*, Goldfuss, and *F. sub-antiqua*, D'Orb., are included with this species as synonyms. *F. flabellata*, Phillips, vary very much in different

* Geo. Mag., May, 1874, p. 197.

† As the descriptions of these species are easily accessible to the geological student, I do no more than draw his attention to a few of the minute details of Nicholson—reference to the larger description will well repay him for the trouble.

‡ Prof. H. H. Nicholson. New Devonian Fossils, Geo. Mag., May, 1874.

* Geo. Mag., 1875.

† "I believe that all that has been written about poriferous keels on the *Fenestella* is wrong, and that these so-called pores are only worn-down rows of tubercles. Like you, I have sectioned specimens showing these worn tubercles, and find they lead to nothing, and have no connection with the cells."—Mr. John Young, F.G.S.

localities. It is fan-shape in character; but the branches of specimens from Richmond, in Yorkshire, differ materially from those found in North Wales. It often presents two different characters in well-developed fronds—so much so that if a good frond was broken and distributed to several Palæontologists, asking them to identify the species, two sets of opinions would be the result. *F. frutex*, M'Coy, seems to be a good species, so also are the *F. polyporata*, and the *F. undulata*, of the same author; but *F. nodulosa*, and *F. tenuifila*, are somewhat doubtful. The *F. formosa*, of M'Coy, is also doubtful in the character of the poriferous dissepiment; but the *F. plebeia*, *F. quadradecemalis*, and the *F. carinata*, of the same author, have pretty constant characters. The *F. crassa*, and *F. ejuucida*, are doubtful. The *F. hemispherica* is a beautiful specimen, but may it not be the young form of some of the larger specimens described as species? Besides these forms there are several others in my list, but after having examined many of the fine species gathered by Mr. Shrubsole from the Halkyn Mountains of North Wales, I am rather in favour of a reduction than of an extension of species. My belief is that many of the so-called species are the result of indiscriminate grouping. The fault of the confusion, is not so much pressed home upon the describer as upon the collector. It may be that no *Fenestella* bands have been so well preserved as are those of the Halkyn Mountain group; and it may be that collectors have been more careful for general, than for particular fossils. Be that as it may, the group well deserves revision, and having a sufficient knowledge of the material at his disposal, I believe the work will be well and honestly done by Mr. Shrubsole.

The *Fenestella* of the Permian rocks are few in number—both as regards species and individuals. The form generally met with in collections is *F. reticularis*, of Schol. In Morris' Catalogue this is given as *F. retiformis*, with the synonyms *Keratophytes*, *Gorgonia infundibuliformis*, Goldfuss, and *Retepora flustracea*, Phillips, but as my own specimens show only the non-poriferous side, I am unable to give any minute details respecting the species. The non-poriferous aspect bears a close resemblance to some of the Carboniferous, and also of the Silurian *Fenestella*; dependence, however, upon this is unsafe as a palæontological guide.

In space this genus had a remarkably wide range; it being tolerably abundant in the Palæozoic series of America. In this country the foregoing remarks will justify my assertion that it was also abundant with us. De Koninck and others have shown how prevalent certain species are in the Bohemian and Belgian series, some of the species belonging to the latter extending as far east as India. In time the genus ranged throughout the whole of the Palæozoic rocks, becoming extinct, so far as is yet known, at the close of the Permian era.

MICROSCOPY.

VARNISH FOR GLYCERINE MOUNTS.—Some time since I asked in SCIENCE-GOSSIP for some varnish which would not be affected by glycerine jelly. No satisfactory answer being given, I had to fall back on my own experiments, and am glad to say I have at last found a varnish, which, worked with others, answers in the best possible manner. The varnish I allude to is gold size, and I find the following method of applying it answer best. Having mounted your slide, and allowed time for the glycerine to set, go carefully round the thin glass circle with a warm pen-knife, then with a fine camel's-hair brush run a ring of gold size round, by means of the turn-table; allow this to dry, then apply another layer, and when this is dry a third; lastly, run a ring of white lead varnish over the gold size, and finish with a ring of green varnish in the centre of the white if your object be a vegetable preparation, or red, if it be animal. I have mounted some dozens of slides in this way, and in *no case* have I so far found the varnish to fail. Let me recommend readers of SCIENCE-GOSSIP, who like myself have had a difficulty in finding a *stable* varnish, to give this method a fair trial. Dr. Carpenter in his work, "The Microscope," it will be remembered, speaks highly of gold size as a varnish. I consider, however, that without some varnish over it, gold size does not make a very neat or a very elegant appearance.—*Charles F. W. T. Williams, the Vicarage, Tinslade, Bucks.*

NEW DIATOMS.—*Melosira Barreri* (Grev.) var. *Hispida Castracane*. This variety is distinguished from the type form by the presence of short teeth or spines scattered over the surface of the valves, but especially on the lower convexity of the frustule. Canal de Trau, Dalmatia, Cyclophora, n.g. *Castracana*, frustules tabular, rectangular, sometimes in series, sometimes free, sometimes connected by a gelatinous isthmus forming a zigzag chain in f.v. linear-oblong, sometimes slightly inflated, valves unequal, one of them with a central loculus, living in sea-water. *Cyclophora tenuis*, Castracane; frustules in f.v. oblong, rectangular, slightly inflated, valves linear, inflated, rounded at the ends, dissimilar, one of which has a central ring or loculus. Length of valve, 44μ 5, 55μ , 2, breadth 4μ 8, 11μ 3. On rocks at Ancona; Naples, in aquarium. (Extracted from *Brebissonia*, a new monthly serial devoted to Algæology and Micrographic Botany, edited by M. G. Huberson.)

DIATOMS IN COAL.—It is, perhaps, in the recollection of our readers, that about two years ago, Count Castracane announced the discovery of marine and fresh-water diatoms in coal ashes. Professor W. C. Williamson, at the Dublin meeting of the British Association, doubted the accuracy of this, and stated that Professor Roscoe had permitted one of

his ablest assistants to make analyses of various kinds of coal, in accordance with Count Castracane's directions, and these ashes he (Professor Williamson) had carefully examined, but had been unable to detect any traces of diatomaceæ. I can confirm this, having myself made many observations on the ashes of various kinds of coal and coal shales; many of the latter were rich in the remains of equisetums and ferns, and ought to have contained diatoms, if any existed at that period. So acute an observer as Count Castracane could not be mistaken as to the presence of diatoms in the ashes he examined, and we must, therefore, come to the conclusion that their presence was accidental. I have examined very many samples of chalk, not only from this country, but also from various other localities, but have never seen any valves of diatomaceæ. I should be glad to learn if any other observer has been more successful.—*F. Kitton, Norwich.*

A COLLECTING STICK.—The following is a description of a collecting stick I have made, and found very useful in collecting diatoms from the bottom of streams, as it does not disturb the mud and sand, like the ordinary collecting bottle. A is a bamboo-cane,



Fig. 233.—Collecting Stick.

with a piece of Indian-rubber tubing running down the centre, such as is used for feeding-bottles; B is a glass-tube fastened to rubber-tube; C is an Indian-rubber ball, by squeezing which you force air out of the glass-tube, and then by placing it near the object you wish to get, and letting the ball expand, the object is drawn up into the tube. On squeezing the ball it is then forced out into the bottle. The stick can be also used as an ordinary walking stick.—*Albert Smith.*

ZOOLOGY.

HOW TO PRESERVE SKINS, &c.—I can give your correspondent J. Y. a really good non-poisonous receipt. It has stood the test of fifteen years, and can be well relied on, viz. :—1. Whiting or chalk, 1½ lb.; 2. Soft-soap, 1 lb.; 3. Chloride of lime, 2 oz. Boil Nos. 1 and 2 with about a pint of water, and add No. 3 while hot. Before adding the lime see that it is finely powdered, or else it will not work smoothly. Another good one is as follows :—Burnt alum, 1 lb.; saltpetre, ¼ lb.; pound and thoroughly mix. This is especially for animals, as when well rubbed in it will fix the fur and hair admirably, and penetrate the thickest skin.—*Edward E. Evans.*

MIMICRY AMONG VERTEBRATA.—Mr. Wallace, in his work on “Natural Selection,” by way of enforcing his arguments, quotes instances of mimicry

among *snakes* only. In the beginning of 1877, when I was stationed at Shwagyeng, in British Burmah, a wild dog was brought to me, and on the first glance I thought it was a young deer! The resemblance was striking in many ways; colour, form, and motions of small deer were imitated in a wonderfully deceptive manner. The head especially was remarkable for its resemblance to the head of a doe, the ears were long and very mobile, and could be thrown back on to the neck in a way habitual to the female of the common hog deer. These wild dogs are rare, but they are to be found on the plains of Burmah, and, as may be readily inferred, they prey upon the small deer which abound in the grassy plains of that country. I kept the animal for several days; it was a young one, and was very fierce. I sent it down to Rangoon as an exhibit for the Phayre Museum and Menagerie there, but the creature died on the way, and the person in charge unfortunately threw away the carcass, instead of preserving it. I hope shortly to be able to get another of these animals, and shall do my best to send it alive to England.—*Arthur Hough.*

PRONUNCIATION OF SCIENTIFIC NAMES.—Mr. Browne (see July No.) is no doubt right in his suggestion that the Latin *qu* was originally pronounced like *k*. In the memoir prefixed to the “*De Naturis Rerum*” of Alex. Necham (born 1157) the following anecdote is related. “Necham abandoned his school at Dunstable, and became desirous of entering one of the monasteries, and he first turned his eyes to the great Benedictine monastery in his native town of St. Alban’s. He accordingly addressed an application to the Abbot in these terms, *Si vis veniam sin autem, &c.*, to which the Abbot, who appears to have been somewhat of a wag, replied, *Si bonus es venias, si nequam nequaquam*” (If you are good, come; if bad, by no means come). *Nequam* of course being pronounced *necham*, this pun on his name offended him, and he did not join the St. Alban’s monastery.—*F. Kitton.*

THE ALTERNATE GENERATION OF THE ECHINODERMATA.—Professor Hæckel has recently sent the following to the San Francisco Microscopical Society :—“The palingenetic development of the Echinodermata, ordinarily known as metamorphosis, which leads to important inferences as to their race history, is to be considered as a genuine alternation of generations, and especially for this reason, that the two succeeding generations are destroyed in order to make possible the change into one another by a single transformation. The first generation, the ‘Nurse,’ or so-called larva, is a solitary, bilateral, limbless individual or ‘person,’ which consists of only one piece or antimeria, and possesses the greatest resemblance to true worm larvæ. On the contrary, the second generation, the perfected echinoderm, has the ground-plan of a symmetrical, five-sided pyramid,

and consists of five antimeria or parts; it forms a true stock or cornus, which is composed of five articulated, worm-like, bilateral persons. When this cornus originates within the nurse by budding, a multiplication of antimeria occurs, whereby from one antimeria five arise. This origin can be interpreted only as a non-sexual reproduction, not as a mere transformation. The true nature of these genuine alternate generations is clearly shown by those sea-stars, in which the body remains free from the five (or more) independent arms, and the central disk, which barely unites the latter in the middle, exists almost as an independent body. These are *Ophidiaster*, *Chetaster*, *Brisinga*, &c. Particularly interesting in this relation are most species of the genus *Ophidiaster*, or *Linckia*, from which several specimens are exhibited (*O. diplax*, *O. ornithopus*, *O. multiformis*, and *O. Ehrenbergii*). Here the single arm, which possesses the morphological value of an articulate worm, is freely detached from the disk, and every arm forms by regeneration both the central disk and the four remaining arms. With numerous specimens of the four species of *Ophidiaster* selected, all the various stages of this reproduction process were shown, and he discussed the significance which these so-called comet forms of sea-stars possess for the morphological interpretation of the same. Therefore we should take as the oldest stem form of the Echinodermata the Asteroidea, from which as diverging branches have developed *Ophiuridea*, *Crinoidea*, and *Echinoidea*. In the last, the centralization of the whole cornus is carried farthest, and from them the *Holothuroidea* have arisen. Thus the *Holothuroidea* stand most distant from the original form of the Echinodermata—the Asteroidea."

BOTANY.

COTONEASTER VULGARIS.—This plant still exists in small quantities on the Orme's Head. I saw it there in July last.—*James Britton*.

POLYPOGON LITTORALIS.—This rare plant, which does not appear to have been recorded for Gloucestershire, occurred this year in considerable quantity, on marshy ground, near the north bank of the Avon river at Bristol. On inquiry it seems that the soil here has been taken from the river bank and bed at places much nearer Clifton, when the river was widened and the new dock-gates constructed, and brought to this marsh to fill hollows from which the clay had been dug for manufacturing purposes. Its appearance is of interest, as furnishing another instance of the occurrence of new plants when soil that has been long buried is brought to the surface.

LIZARD ORCHIS (*Orchis hircina*).—I had sent to me last June a very fine specimen of the Lizard Orchis (*Orchis hircina*). It was found in a chalk-

pit at Greenhithe. As I see from Hooker and Arnott's "British Flora," published 1850, that the plant "is very rare (perhaps now extinct)," it may be interesting to your readers to know it has been found so recently. I enclose one dried blossom that you may be sure of its authenticity. The plant was nearly 3 ft. high, the spike of blossom over 21 in. Perhaps if it has been found by any other of your readers they will let you know, as it must be a pleasure to know so handsome a plant is not yet extinct.

GEOLOGY.

A NEW GENUS OF FOSSIL CORALS.—Mr. James Thomson, F.G.S., who is well and widely known as an enthusiastic student of carboniferous corals, has just published a monogram on a new genus, which he has named *Albertia*. He also gives us, in the same elaborate paper, a short sketch by which it has been attempted to delineate the internal structure of fossil carboniferous corals during the last twenty years. Most palæontologists are aware that Mr. Thomson has succeeded in causing thin sections of coral to photograph themselves on sensitised copper-plates, so that every line is truthfully portrayed. Mr. Thomson, after a long account of failures that would have damped the ardour of a less enthusiastic geologist, relates his triumph as follows:—"It would be tedious to enumerate the various other unsuccessful attempts I made in the way of obtaining casts fitted for the accurate reproduction of structural details; but I may say, generally, that these attempts were very numerous, that they occupied a large portion of my leisure time for several years, and that they involved a very considerable amount of expense. Out of these laborious attempts, however, there finally emerged the process which I now employ, and for which I claim the merit of being applicable to the accurate delineation of the minutest details of coralline structure, and of being comparatively inexpensive. This process I have now used for two years for the production of lithographic plates, and quite recently I have succeeded in modifying it so as to produce electrotypes for use in the ordinary printing-press. Of the first form of this process, I may say that it consists in taking an impression of the structure upon a sensitised copper-plate, that this impression is then engraved upon the plate, and that a transfer is thence taken and put upon a lithographic stone. Of the second form of it, I may say that an impression is taken upon a plate of sensitised copper, that the plate is next engraved and etched very slowly, but somewhat more deeply than in the first case, that a cast in wax is taken from the plate, and that from this again is produced an electrotype in the ordinary way. The fact that the process which I have now so far described is applicable not merely to the delineation of structures presented in my own

favourite pursuits, but also to the delineation of the minute structures which present themselves to the anatomist, the physiologist, the pathologist, the botanist, and many others, is, I conceive, one of its chief merits."

LIVERPOOL GEOLOGICAL SOCIETY.—The Proceedings for 1876-77 of this well-known and vigorous society contain the annual address of the President, Mr. T. M. Reade, F.G.S., and papers on local geology as follows: "Glacial Striations at Little Crosby," by T. M. Reade; "The Conditions existing during the Glacial Period, with an Account of the Glacial Deposits in the Valley between Tranmere and Oxtun," by Dr. Ricketts, F.G.S.; "The Glacial Striae of the County around Liverpool," by G. H. Morton, F.G.S. (Hon. Sec.); "The Carboniferous Limestone and Millstone Grit of Llangollen," by G. H. Morton (*continued*); and other papers of general geological interest.

NOTES AND QUERIES.

ANIMAL VENTRILOQUISM.—Two very interesting notices of Brazilian fauna occur in Mr. Rigg-Wither's account of his work and wanderings in the forests and prairies of Parana, the one of a frog, and the other of a bird. The author does not give a description of either sufficient for determining their species, but he refers to both of them as possessing in high development the special power of ventriloquism. This is not only of much interest in itself, but as it is the first instance I have met with of any animal lower than man being gifted with this abnormal faculty, I venture to ask room for the following condensed abstracts from the "Pioneering in South Brazil," with a few observations which the narration suggests. At page 145 of vol. 1, Mr. Rigg-Wither, whilst camping out near Porta Grossa, notes that "a cry, like the moaning of a sick child, came waiving on the ear, apparently from only a few yards off; the tone, however, was too musical for a child's cry. The vocalist was a frog, and soon another from a more distant spot took up the strain, and the two sang together, now in solos, now in chorus." The author "took a torch and proceeded to the spot from whence the sound was (or seemed to be) proceeding." He "stooped to search in the grass, when the music seemed to float away to another place some yards distant, and on following it, the sound still moved, but nowhere could he discover whence it came. The fact is, this frog is recognised to be a ventriloquist of no common order"—a property the author reasonably concludes to be "given him as a protection against the numerous cranes and other frog-enemies that would otherwise be guided by the sound, and soon render the species extinct." Again, in vol. 2, page 193, a bird, notable for its shrieking voice, and known as the Bell-bird, is thus referred to: "It is seldom seen in its wild state, being, like the musical frog, a ventriloquist of very high powers, and as a sun-loving bird, a frequenter of the highest tree-tops, where its snow-white plumage and transparent wings render it almost invisible, even when in motion. In size it is but slightly bigger than a starling, with a voice powerful as a peacock's." From a description of this bird's performances in a cage, at Antonia, its notes were heard in every quarter of the town as well as beyond the outskirts, and seemed at

times "to come from the mountains at the back of the town fully a quarter of a mile distant from where the bird was actually engaged." Calling to mind the peculiar cry of the Corn-crake (*Crex pratensis*), and one's similar inability to trace the varying points from which the sounds appear to proceed, I beg to add a parallel extract from an account of the habits of this eccentric vocalist of our own meadows. "The crake, crake, crake of the landrail may be heard during May and June, resounding on every side, now close at hand, as if the bird were not a yard distant, now far off; while the voices of others in different parts are unremittingly exerted. The note is the call of the male to his mate. So shy and cunning is the bird that it is seldom to be seen, and unless by means of a dog accustomed to such work, it is almost impracticable to force it to take wing. It seems to elude pursuit as if by magic, and is here and there threading its way through the long grass before its pursuer can imagine it has even left the spot from which its call had first resounded. Its swiftness and dexterity are indeed almost incredible." (Knight's Museum of Animated Nature.) It will be observed that no attempt is here made to account for the sudden changes of the cries heard, now near, and now far off. It is taken for granted that the crake, by some sort of *superhuman* speed of foot, can elude its pursuer as "if by magic," before it can be imagined to have left the place from which its call first resounded. The performances of a human ventriloquist afford the aptest illustration, if not a credible and rational theory, for all the conditions of the hypothesis accepted by Mr. Rigg-Wither being fulfilled by the incidents he records, and which are remarkably enforced by the manoeuvres described in the last extract, of "the sly and cunning" Corn-crake. I am desirous to learn if any naturalist has noticed similar phenomena in any other bird or beast, and if so, whether the solution above indicated has been referred to, if not recognised. This marvellous faculty may possibly be a vestige of a once more extended power conferred on the animal creation, as a means of defence, by deluding and so evading their enemies. Can any of your readers assist me in these inquiries?—*A. H. B.*

PRESERVING ANIMALS.—I think Mr. Beaumont will find the most complete information in Waterton's "Wanderings in South America," published by B. Fellowes, Ludgate-street, 1852. Further useful particulars are given in his first series of Essays on Natural History, Longman, Brown, & Co., Paternoster-row, price 8/-. An abridged account appears in a small work on Taxidermy, by J. Gardner, 426, Oxford-street, price 1/6. Another account is shown in "Taxidermy," by M. Brown, Bazaar-office. If any further information is required respecting the details of the system I shall be glad to quote them from any of the works named.—*J. C. Carritt, King's Lynn.*

PRESERVING ANIMALS.—In answer to W. L. Beaumont, I beg to furnish an outline of Waterton's method of preserving animals:—"Wash the animal well in soap and water with a hard brush. Then skin the animal, taking out every bone to the last joint of the toe next the claw, and proceed to pare down from within the nose, the lips, and the soles of the feet, and sew up the mouth from the inside, beginning exactly in the front, and continuing the operation each way to the end of the gape. Now immerse the skin in a solution of corrosive sublimate in alcohol; take it out and fill it quite full of chaff, and proceed to support it on the table by introducing into the abdomen a machine made by joining two pieces of wood in the shape of a carpenter's gimlet, and of

size corresponding to the size of the animal. Let the shank of this machine hang down outside the skin, just as though it were a fifth leg in the centre of the body, and let it pass through a hole in the table, and then be fastened at sufficient height by a couple of wedges. Now touch the nose, lips, and orbits of the skin with a mixture of one part of salad oil and three parts spirits of turpentine, and repeat this touching every day till the finish. Then with a penknife cut small holes on the top of the head, behind the root of each ear, under the jaws, others on the back, and one under each foot. Now working through these holes with a piece of iron, from the size of a large darning needle to that of a ramrod, and shaped at one end like a carpenter's prickler, push out every part of the skin which ought to be pushed out, and reduce with the end of the finger any part that may be too prominent consistently with the *expression* and form which the animal exhibited during life. The lips must be reformed by means of two irons, one held in either hand, and working in opposite directions outside and inside. In due course of time, as the skin stiffens, the artist will see (as the sculptor does) the features gradually appear; and at last the skin will retain the slightest impression communicated to it by the touch of the working iron. A slit must be made in the crown of the head, or under the jaws, to allow of the artificial eyes to be fixed with a little putty or wax. Two or three weeks' practice is required in order to become an adept at this mode of preserving animals; but of course there must also exist a considerable native talent and taste for sculpture. The foregoing account is condensed (perhaps too much so) from an article on Museums in the first edition (1838) of Waterson's "Essays on Natural History." It will be observed that this process is simply one of modelling: the softened skins of animals being operated upon instead of the clay of the modeller or sculptor. Various other methods of preserving animals (especially birds) have been described in the "Philosophical Transactions" for 1770, in "The Naturalist's and Traveller's Companion," in the "Natural History of Guiana," in the Amiens Acad., vol. ii., in the "Boy's Own Magazine" for 1859, in the "Boy's Journal" for March, 1863, "The Art of Taxidermy," published by F. Warne & Co.—*P. Q. Keegan, I.L.D.*

BARK BREAD.—In a note to page 528 of the *Flora Vectensis* is the following: "*Panis hic albus est dulcis et gratissimus, presertim recens. Usus hujus panis primarius et receptissimus apud,*" &c., &c. Linnaeus says the bread is sweet and grateful, but he does not say that it is composed solely of the roots of the Calla; but he does say, "*hæc farina miscetur cum farina*" (he does not tell us in what proportion) "*Cerealium vel Pini, et exinde conficitur panis secundum artem.*" The above quotation must have been printed incorrectly, it should be, "*Panis hic est albus, et dulcis, et gratissimus*" (this bread is white, sweet, and very palatable). "*Usus hujus panis primaris, et receptissimus apud,*" &c. (This is the bread chiefly used by Norwegians and Swedes, and they like it very much.) But the flour from the roots of Calla is first mixed with rye or barley meal, and often with powdered pine bark; and of these the bread is made in the ordinary manner. We may add, the mixed bark of the pine is, even now, thus used.—*J. F. Robinson.*

WILD ANIMALS AND MAN.—An interesting lecture was recently delivered at the Society of Arts, by Sir J. Taylor, on the destruction of life by wild animals in India. An extract or two may, perhaps,

be of interest. In 1876, 18,273 persons were killed by wild animals; out of these, 15,946 lost their lives by snakes, 917 by tigers, 887 by wolves; the remainder being by leopards, bears, hyenas, &c. In the same year 54,430 cattle were destroyed. The number of wild animals killed during that time were 234,830, out of which snakes were 212,371. There are several ways of compassing the tiger's death. They are snared in pitfalls and traps, shot by spring guns, poisoned by strychnine, and killed by sportsmen. The natives of India, especially the Hindoos, hold the tiger, as they do the cobra, in superstitious reverence; many would not kill him even if they could, for they fear that he would haunt or do them mischief after death. In one instance in the Central Provinces a single tigress caused the desertion of thirteen villages, and 250 square miles of country were thrown out of cultivation. In 1869 one tigress killed 127 people and stopped a public road for many weeks, until finally killed. The shark is a fierce and bold creature; he dashes in amongst the crowds bathing at the ghâts, and though he seldom, if ever, under these circumstances, succeeds in carrying off his prey, yet he inflicts a dangerous, often a mortal, wound. These accidents appear to have become more common of late years, since the practice of throwing bodies into the river has been discontinued.—*H. Budge.*

"**SUGARING.**"—In reply to your correspondent, "W. W. Walter," I used to do a little in the gentle art of sugaring, and as I was pretty successful, a few hints of mine may be of use. The best mixture to my knowledge is *Jamaica foots sugar* gently boiled in stout or porter, care being taken not to burn it. As most of the sugar known as "moist sugar" is actually refined sugar, and not the raw material at all, it is not good for the purpose. When made, a little rum may be added just before using. Several suggestions have been offered at times as to the advantage of adding oil of *anise seed*, and other oils of a similar nature, as powerful moth attractors, but I do not think they are so potent as supposed, a great deal depending on the weather chosen for a sugaring expedition, which should be a moonless night with a light south or south-west wind, a moonlight night or east or north wind being quite enough to ensure an empty bag. Although the autumn for numerous reasons is the best time for sugaring, still, there are other times of the year when lepidoptera are captured at natural or artificial sugar. In the spring the catkins of the willow or sallow are most killing traps for the Tæniocampe, and a sheet spread under a willow in bloom will be almost sure to catch such specimens as *Stabilis*, *Munda*, *Cruda*, *Gothica*, &c., on the branches being shaken. Reverting again to sugaring, the mixture should be laid on with a brush on the lee-side of trees, about 5 feet from the ground, and I have found that exposed trees are the best, I presume from the fact of the wind carrying the scent better; where there are no trees I have succeeded with pieces of rag or fragments of bark or board, either fastened on a bush, or in want of that, a post, gate, or rock.—*Edward Lovett, Croydon.*

A STRANGE PLACE FOR MARSH PLANTS.—For a considerable time operations have been in progress for the construction of a new wet dock at Leith, and for this purpose upwards of eighty acres of a low sand-flat, known as Leith Sands, has been reclaimed from the sea. The greater part of this being within tidemark, was consequently covered and left dry alternately with every tide, and no vegetation, terrestrial or marine, was apparent. But since the reclamation wall was finished, and the salt water

excluded, along a muddy place on the sands a number of marsh plants have sprung up, and some of the species are growing in great abundance, many of them being at this date (July 1st) in full flower. I have observed the following:—*Ranunculus sceleratus*, *Nasturtium officinale*, *Stellaria uliginosa*, *Epilobium hirsutum*, *Callitriche verna*, *Veronica Anagallis*, *V. Beccabunga*, *Alisma Plantago*, *Fucus glaucus*, *F. lampocarpus*, *F. bufonius*, *Scirpus setaceus*, *Alopecurus geniculatus*, and *Catabrosa aquatica*. The first and last-named species are both common on the coast between Leith and Portobello, but the others appear to be new. Now the question naturally occurs, how do they happen to be springing up there? I am not aware of any satisfactory explanation that can be given, and supposition will throw no light on the subject. But as all who take an interest in the matter will have their own opinions, the following is given as a possible, if not a very feasible, one. We may suppose that a stream once entered the frith at this place, that aquatic and marsh plants grew in and around its margin, that its mouth was gradually encroached upon and covered by the sea, and the marsh plants disappeared. But their seeds remained in the sand in a state of dormant vitality, and withstood the action of salt-water and other adverse influences, perhaps for many years, till now, surrounded by conditions favourable to their development, they are again springing up into life and luxuriance.—*D. Douglas, Leith.*

A DAY at CLIVENEN.—By the kind permission of his Grace the Duke of Westminster, I was enabled, on Saturday, July 6th last, to take my class at Westminster Hospital for a field-excursion through the above grounds. The day was, in every sense, favourable for such an excursion, and the result was well worth the journey to Taplow. We were fortunate enough in the space of three hours to collect some 119 different species, representing thirty-nine natural orders. The walk from Taplow station to Clivenen is one of the best to be found round London for its abundance of flowers of all kinds, and the gravel-pits *en route* are a storehouse of treasures to the enthusiastic botanist, who will find himself amply rewarded for any trouble taken by studies of many of our most beautiful wild-flowers, from *Verbascum Thapsus*, which grows in rare luxuriance, down to the humble *Fedia ditioria*. The Hypericaceæ are well represented, no fewer than eight species being seen, and Boraginaceæ, Dipsacæ, Solanaceæ (including *Atropa belladonna*) and Onagraceæ form prominent features in the neighbourhood. A longer search would doubtless have only considerably raised the number of orders represented, seeing that our investigations, hurried as they were, produced the above number.—*H. W. S. Worsley-Benison.*

CURIOUS PLACES FOR NESTS.—I dare say your readers will be able to recall curious instances of the choice birds have made in selecting a place for a nest, but perhaps none more eccentric than the following. A short time back a tomtit took possession of a beehive, deserted by its proper inmates, and, having cleared out the comb, filled the circumference of the hive with wool and moss, in the centre of which it built its nest and reared its young. And a friend now sends me another curious instance. In his garden were four inverted 12-inch pots. The titmouse must have had curious stairs down to his nest, which was built on the ground in the last pot.—*George Dovelker.*

HAWKS IN IRELAND.—Can you give me any information about the various species of hawks to be

found in this locality, as we have observed four distinct varieties, and have captured and trained two? The one we have at present is ruddy-brown on back and head, with black bars, tail also barred, eye black, full, and encircled with yellow band of skin, beak with tooth or notch in upper mandible, emarginated wing, with notch or sinuosity situated near the end of the quills, breast fawn-colour, with black markings perpendicularly; he has a moustache of black hairs on the cheeks, head round and full. The first hawk we had was quite different: he had a flattened head, with projecting ledge over the eye, which gave him quite a sinister expression; back very dark brown, breast white, with horizontal black bars, very long toes, and curved claws. Both these birds were taken from the nest and tamed. As I see natural monstrosities sometimes mentioned in your journal, I mention a deformed chicken which was hatched here and preserved by me. It has four legs, three of the legs being at one side, and of these three legs two have the elbow-joints reversed (and also the thigh-joint); there is but one thigh-joint for the two superfluous legs, the third leg at that side has a thigh-joint in the natural position; all the legs are perfect as to feet, claws, &c. This bird chipped the shell, but died in coming out. It is a Bramah.

IZAACK WALTON.—Perhaps some of the readers of SCIENCE-GOSSIP may be interested to hear that a marble bust has just been placed in St. Mary's Church, Stafford, of Izaak Walton. The ceremony of unveiling was performed by the Earl of Lichfield. The bust has inscribed upon it, "Izaak Walton, Piscator; born in the parish of Stafford, August 9th, 1593; baptized in St. Mary's Church, September 21st, 1593; buried in Winchester Cathedral, December 19th, 1683. Erected by public subscription, 1878." The bust was decorated by a Stafford lady with various water and other plants, such as the gentle old fisherman loved so well, and which still grow luxuriantly among the bright streams, so plentiful about his native town, where the author of the "Complete Angler" first imbibed his love for angling, and still greater love of nature. The poor of Stafford receive still an annual benefit from the friend whose bust they can now look at, and which will, in a measure, enable them to realize their kind benefactor. The "Complete Angler" has had its adverse critics, but Charles Lamb, in a letter to Coleridge, the poet, dated October, 1796, speaks of it in these words: "It would sweeten a man's temper at any time to read it; it would Christianize every discordant angry passion: pray make yourself master of it." The "Complete Angler" has gone through well-nigh sixty editions in this country alone.—*E. Edwards.*

SPIDER INSTINCTS.—Seeing a paragraph in your September number illustrating the possession of an acute instinct in spiders encourages me to trouble you with one or two observations of a like nature that have come across my attention in watching spiders' motions. I was watching recently the completion of a web, and observing the apparent self-satisfaction with which the spider at the finish settled down, after some tightening and fortifying processes, in the centre. It seemed to me that the spider in question settled down as if in the full happiness of a domestic establishment—say, house, pictures, and so on, and the only remaining need would be the daily bread that he would require. Reflecting thus, I wondered how far he would resent any infringement or slight disturbance upon his "castle;" to ascertain which, I put a small curled-up leaf through, or partly so, one of the interstices at the lower part of the web. I was

astonished at the promptitude of Mr. Spider's observation: he was at once militant, and sallied forth, and gradually one by one appeared to unhook the web wherever it had hold of the *upper* part of the leaf, so that being thus loosed the leaf *rolled* over until again suspended at a lower level (*i.e.* just the breadth of the curl of the leaf) by the film which had fastened to the lower part originally, and which, of course, now became the top part. Quicker than the time taken to read this, the spider seemed in like manner to unfasten the newly-placed upper part, and of course the leaf rolled over again, and this method of proceeding was continued until at last the leaf was rolled beyond the limits of the web. Thus freed from such an intrusion, the spider seemed to squat down again comfortably enough in the centre. Surely, thought I, another attempt will not be cruel, and so I placed an angular bit of a leaf (about half an inch square) in the upper part of the web. Immediately my friend started forth again. Taking stock of the invading leaf, he seemed to decide that a new method of attack was necessary in this case, and so he speedily unbuckled each entangled corner of the leaf, and grasping the latter with the full expanse of all his limbs, he seemed to take it out of the mesh, and by a herculean feat to expel and throw it away outwardly from all contiguity with the web, so that it at once fell to the ground. After this, he returned to the domestic hearth in the centre. I was singularly struck by the apparent method pursued in face of these difficulties, and did not again impose upon his good nature for any further edification. On another occasion, a very large spider had spun a web across the frontage of some Virginian creeper leaves. I had no experimental intention in disturbing the "animal," and so, I forget whether I destroyed the web or merely commenced by teasing the spider. Whichever it was I however remember that he presently beat a quick retreat beneath some of the curved leaves, and from one place of refuge to another I continued to fidget him. At last—perhaps he was exhausted—he seemed to say, "I shall go no further," and the little twig (about a foot long) in my hand with which I had teased him, failed to dislodge him from his chosen refuge. He kicked out in reprisal to my annoying him, and seemed to wince, so I imagined, with great indignation. While this was going on, I happened to pull my twig of branch nearer to myself, and observed that the spider had attached a line to the end of it, and that it was continuous and unbroken. It immediately struck me to test the length to which, in the spider's wrath, I might extend the film. Steadily and carefully I carried my twig across a distance of about 9 or 10 paces of ground (about 22 feet) and fixed the free end of the twig branch into the trunk of an adjacent tree. I had therefore stretched a fine filamentous thread across a distance I never expected, and although it was so exceedingly fine and attenuated that it was only by difficulty that I could trace its course, yet it was apparently as continuous and intact as a telegraph wire. To prove this, I picked up some blades of grass, and by bending them into an angle I was enabled to *hang them upon* the spider line. At varying distances I placed a blade here and then a blade there—only, by-the-by, in *single* blades, for I was afraid of overtaxing the "line." If I remember aright, I had hung up five of these blades; but the weight of the sixth proved to be the straw which broke the camel's back—my line broke. This seemed an extraordinary case, for the spider seemed to throw out an unlimited length of "wire," and seeing I was enabled to put thereon five or six blades of grass—each blade being probably of greater weight than

the whole length of film—he might perhaps have allowed me to "run out" 30 feet or more of his gossamer thread had I carried my twig that length in the first place. My last observation of spider instinct has been in the construction of the web itself, but I fear to trespass further on your space just now, however interesting and wonderful these phenomena of nature and life may be.—*J. F. S.*

ENGINEERING SKILL OF A SPIDER.—The following specimen of the engineering skill possessed by a spider may possibly interest your readers. It was discovered in an office in this town (Omagh), and was kindly shown to me by a gentleman connected with the concern. A spider, desirous of making a web, being either hard-up or taking a thoughtful view of matters, appropriated a string for an outside border, and that in a very curious manner. The string was a stout one, and hung perpendicularly from a beam. Moreover, it had a copper-wire hook attached to its end. The spider must have crept down the string, and fixed the end of one of its own lines to the eye of the copper hook, then ascended the string, carrying its own line with it, walked along the beam as far as nine inches, and then fixed the other end of its line. It must then have pulled bit by bit at the line, till it had drawn up the copper hook, and made the string describe a curve; and considering the size of the string and the size of the spider, it must have been a rather arduous task, requiring plenty of patience and perseverance. It then, by a few more lines cleverly placed, managed to relieve the strain on the main line, and complete the foundation. The web was never completed, but was left in its present unfinished condition.—*Isaac Crawford.*

CAT AND RABBIT.—When living in Essex a few years back I made the acquaintance of a splendid cat, of a glossy black from the tips of his whiskers to the end of his tail. In temper and disposition he differed from most pussies, for he was a morose old fellow, and seemed to have very little affection for anything but cat's-meat. The cry of "meat" seemed to electrify him, but after his "haporth" had been duly disposed of he would retire within himself, and take no further heed of temporal things. A more unsociable old Turk could not well be imagined. And yet—would you believe it?—this reserved old character had a soul (or its equivalent) tucked away somewhere under that black exterior, and this is what brought it out. Another member was added to the family in the shape of a glossy black and white rabbit, which in a short time was leading a very "free and easy" life on the premises. Well, between this pretty creature and the morose old "blacky" an acquaintance sprang up which by degrees ripened into a downright fancy for each other's society. Then they took to romping and playing together, and after a time the two oddly-matched animals might be seen lying on the hearthrug together, pussy's sable paws lovingly clasped round bunny's snowy neck.—*W. H. Warner.*

A MYSTERIOUS GIFT.—I beg to draw P. A. Allan's attention to the following paragraph, relating to the wonderful power of sight possessed by M. Fillifay. It is taken from a work entitled "Mauritius or the Isle of France," by the Rev. F. P. Flemyng, M.A., F.R.G.S. "It was from this station (*viz.* the long Mountain) that the notable M. Fillifay, some years ago, used to astonish the colonists, and indeed the world, by the singular power of sight which he possessed. His time for observation was usually at dawn, and by directing his vision to the clear unclouded sky (and not to the horizon), he could behold,

inverted (with the naked eye), any object within the singular circuit of his sight. The accuracy of his observations was verified when the British squadron was assembling at Rodrigues (an island 300 miles eastward of Mauritius), in the year 1810, for the attack upon the island. M. Fillifay stated so to the French governor, and was, it is said, imprisoned for raising false alarms. At another time he discerned what he described as two ships joined together, or, if there were such a thing, a four-masted vessel; within a few days a four-masted American schooner arrived in Port Louis harbour. He also described a large Indiaman dismasted when nearly 400 miles from the island, and afterwards announced that he could see that she was erecting jury-masts, and was steering for that port. This proved to be the case. He was a pensionnaire on the Treasury, and for years used to render 'his report' at the Port-captain's office, which was always written down by the officer as he laconically announced it: A ship, N.E. 200 miles, nearly becalmed; a schooner, W., will make the land tomorrow; two brigs standing to the southward, &c. It is a remarkable fact that, although this old man visited Bourbon, Europe, and several other places, he was unable to exercise this singular faculty of vision anywhere but at Mauritius. This, most probably, arose from the singular rarity of the atmosphere on this island, which is certainly most remarkable. He is since dead. He professed, at one period of his life, to be able to teach this mode of vision, and even obtained a fair and ambitious pupil, but he found that a Power beyond his could alone impart this wonderful gift.—*J. Henry Maughan.*

HAVE PALMS TAP-ROOTS?—As a rule the radicle of monocotyledonous seeds is little, if at all, developed; so that tap-roots are generally said not to occur in the class. A true tap-root must be the direct prolongation of the radicle. Palms seem, however, to be somewhat exceptional, to judge from the most readily accessible account of their germination, viz., that in Mr. W. B. Hemsley's papers on Garden Botany in the *Garden*, vol. xiii. (1878), p. 288 (March 30), from which I take the substance of what follows. The radicle or primary root is very often vigorous in seedlings, but it is stated that it is soon replaced by succeeding roots which appear above its apex, i.e. are lateral adventitious roots like those of bulbs. Whether this is invariably the case is uncertain; but the genus *Borassus* is a good example of this replacement. The stout tap-root of the young seedling in this genus is soon surrounded by adventitious roots, to which it surrenders its work, itself dying off. In another genus, *Sabal*, however, the primary root seems to be a lateral outgrowth of the embryo, the radicle apparently not being at all developed. On the whole, the preacher who said that palm-*trees* had not tap-roots was decidedly nearer the truth of the two.—*C. S. Boulger.*

HACKNEY MICROSCOPICAL AND NATURAL HISTORY SOCIETY (194, Mare-street).—The members of this society made another excursion on Saturday afternoon, the 19th October, under the presidency of one of the honorary members, Worthington Smith, Esq., F.L.S., F.R.M.S. The place of assignation was Chingford, from thence through the old forest to High Beech, returning by way of Loughton. The special objects of research were "fungi," which are found in this part of the forest in quantity and variety sufficient to repay the labours of the numerous company assembled, though comprising entomologists, microscopists, and students devoted to other branches of natural history. The weather was fine, perhaps

rather too dry for the specific object in view; the forest was clothed in the varied tints of its autumnal foliage. The way being led by such an authority on "fungi" as the president for the occasion, gave to the excursion an interest and charm peculiarly enjoyable; and the instruction thus gained by an afternoon spent in the investigation of this page of nature's history will long be remembered by those who were so fortunate as to be present. No fewer than thirty-six species of fungi were collected and identified.

WHAT WAS THE "FAGUS" OF THE LATIN?—Was the Rev. J. Mitford (formerly editor of the *Gentleman's Magazine*) right when he asserted that "fagus" must mean the sweet chestnut? because Cæsar says the Britons had not the fagus. Landing in Kent or Sussex, Cæsar must have seen the beeches, which love a chalky subsoil. The "*Spanish chestnut*," as it is often called, is no doubt an importation from abroad.—*W. H. Freeman, Reepham, Norwich.*

LAPWING AND HAWK.—Some five years ago Mr. G. R. Bull, of Stafford (who related to me the incident), was driving out one morning, a few miles from Stafford, with, I believe, Dr. Day, when they suddenly heard a confused rustling noise overhead, and something then plumped down into the ditch by the roadside. On alighting they found a hawk and lapwing in deadly embrace, the hawk's talons embedded in the lapwing's breast, the bird just expiring; the hawk already dead, from the beak of the lapwing being fixed in the eye and brain of his enemy. As the latter had made his fatal pounce, the intended victim had made one supreme effort, and by a lucky peck in the one vulnerable spot, avenged his own death.—*Alf. Freer.*

ORNITHOLOGICAL INSTRUMENTS.—Where can scissors for cutting the bones of the embryo in birds' eggs, described in Prof. Newton's "Suggestions for forming Collections of Birds' Eggs," be procured? also German-silver blowpipes?—*Beta.*

ARGE GALATEA.—Could any of your correspondents inform me as to whether *Arge Galatea* has ever been noticed near Bedford before? I took a rather fine specimen at the close of August this year.—*W. E. Fairbridge, Bedford.*

"BOB-OWLERS."—It may interest those of your readers who care to note the local names of plants, insects, &c., to know that in Staffordshire the thick-bodied moths are called "Bob-owlers."—*K. D., Almondsbury.*

NOTICES TO CORRESPONDENTS.

TO CORRESPONDENTS AND EXCHANGERS.—As we now publish SCIENCE-GOSSIP a week earlier than heretofore, we cannot possibly insert in the following number any communications which reach us later than the 9th of the previous month.

W. T. HORN.—Thanks for the specimen of *Helichrysum*, which, unfortunately, was jumbled into an indistinguishable mass when it reached us. Get Burbidge's "Cool Orchids and How to Grow Them," with plates, published by Hardwicke & Bogue, 192, Piccadilly, price 6s. It is the best work of the kind we know.

A YOUNG BEGINNER.—Mr. Collins has recently issued what he calls a "Histological Microscope," at £5. 10s., which would answer all your requirements. It is a marvel of mechanical skill, and can be easily stowed away. It is sufficient for all the requirements of a natural history student.

W. H. JONES.—The spikes of *Plantago* are the largest we have seen.

E. F. EVANS.—For details concerning the construction of an Egg Cabinet see "Notes on Collecting and Preserving Natural History Objects," price 3s. 6d., published by Hardwicke & Bogue.

K. D. (Almondsbury).—*Orbitolina* is a genus of *foraminifera*.

G. O. HOWELL.—The calyx segment of the Bud of Fuchsia you enclosed has reverted to the condition of a true leaf.

H. F. RASELL.—Get "Half-Hours with the Microscope," by Dr. Lankester, with chapter on the "Polarisation of Light," by F. Kitton, published at 4s. by Hardwicke & Bogue, 192, Piccadilly, London.

A. SMITH.—Get Cooke's "Microscopic Fungi," (illustrated) price 6s. London: Hardwicke & Bogue, 192, Piccadilly.

K. D.—Bentham's "Handbook of the British Flora," published by L. Reeve & Co.; and the Second Edition of "Hooker's Student's Flora of Great Britain," just out, published by Macmillan.

R. RATTRAY.—Many thanks for your excellently mounted slide of *Licmophora flabellata*.

M. SHAW.—Accept our thanks for seedlings of the Date Palm.

W. H. SHRUBSOLE.—"Banded-flints" were originally formed by the filling-up of cavities in nodules, layer by layer. Subsequently the nodules have been broken up, and the harder banded parts liberated, and rolled into the shapes and appearance in which you see them. (2). The boring appears to have been made by some other mollusc than *Teredo*. (3). No doubt the concretionary nodules, and the appearances you describe, are due to the soft, decomposing, organic matter of the animals whose hard parts usually form the nuclei, having caused chemical segregation.

TO QUERISTS.—We are obliged to postpone the publication of several answers until our next, on account of want of space.

EXCHANGES.

IN exchange for a few Microscopic Slides, a Flying Fish 8½ inches in length, from Pacific Ocean.—W. E. Barker, Jesus College, Cambridge.

IN exchange, a Centipede (in spirits) from Honolulu.—W. E. Barker, Jesus College, Cambridge, for Microscopic Slides.

WANTED, Perfect Specimens of *Acidiciaci*, unmounted. Several species of *Puccinia*, *Uromyces*, &c. offered.—E. W. Halway, Decora, Iowa, U.S.A.

A NATURALIST having a large collection of British and Foreign Birds' Skins at his disposal would be glad to hear from any gentleman requiring the same, either in lots or singly, in exchange for other Skins.—W. Barrett Roué, 165, White Ladies'-road, Bristol.

SEVERAL splendid Slides of Algae for well-mounted Parasites, also British Butterflies, and some Birds' Eggs, including gold crest, black-cap, great tit, redstart, and several others, about twenty-five in all. Desiderata, Birds' Skins, particularly hawk, owl, or woodpecker tribe, or swallows and British Lepidoptera, not in collection.—W. Barrett Roué, 165, White Ladies'-road, Bristol.

WANTED, Devonian Rocks and Fossils, in exchange for specimens from other formations.—Thomas D. Russell, 48, Essex-street, Strand, W.C.

WANTED, *P. machoni*, *G. rhanni*, *C. Hyale*, *C. edusa*, *A. cratagi*, *A. Galathea*, in exchange for British Birds' Eggs, blown with one hole.—T. V. Devey, Woodland, Cockfield, Darlington.

CORNISH Rocks and Minerals, Diallage, Serpentine, Steatite, Mica Schist, Luxulganite, Schorlite, Schorl, &c., in exchange for Scientific Books, Fossils, Rock specimens, and Minerals.—J. S. Hsley, 6, Trevelthen-terrace, Falmouth, Cornwall.

Erythraea latifolia (vera) and 460½ for the following, exclusively, 101b, 153 var.?, 153b, 202a, 215, 461b, 536, 544 to 546, 691b, 708, 721, 861b, 874b, 934, 970b, 1212, 1219c, 1223, 1228, 1238, 1262, 1266, 1267, 1282c, 1298, 1453, 1457, 1476b, 1554, 1624.—J. Harbord Lewis, 145, Windsor-street, Liverpool. 1,000 polished specimens of Madreporae, Minerals, Fossils, British Shells, in exchange for foreign Shells, good Ferns from coal measures, or good Silurian Fossils. Will also send good polish slabs of Madreporae for slabs of the Bristol or Clifton Landscape Stone, or a box of rough Madreporae for a box of good and well-marked rough Landscape Stone.—A. J. R. Sclater, Naturalist, 9, Bank-street, Teignmouth, Devonshire.

FOR a pair of *Fedonia Conspiciuta* (frosted yellow), send a good slide of clean Diatoms or Anatomic human, for half an ounce of foreign sand, containing foraminifera, specular talc, &c.—Send slides as above.—E. Eaton, 48, Currier's-lane, Ipswich.

I AM collecting various Specimens of Pond Life, and shall be glad to exchange for unmounted or mounted microscopic objects or accessories. Wanted particularly, unmounted anatomical sections, either stained or injected.—C. W. Lawton, 5, Montpelier Vale, Blackheath, S.E.

WANTED, Diatoms and Desmids, good slides of material, in exchange for other slides or rare British Plants, L. C. Nos. 104, 146, 184, 176, 253, 368, 527, 556, 611, 704, 767, 769, 831, 858, 913, 929, 975, 999, 1001, 1139, 1218, 1293, 1519, and

many other lists exchanged.—J. Tempère, 12, Cecil-street, Moss-side, Manchester.

Licmophora flabellata, growing on algae, stained and mounted in balsam, for good samples of Marine Diatomaceous Earths.—R. Ratray, 39, Balfour-street, Dundee.

SPECIMENS of the new mineral Hüllite, described at last meeting of British Association, also Trachyte, Chalcedony, &c., from the basalt of county Antrim, in exchange for Lias, or Cretaceous Fossils, or recent British Shells.—William Gault, 68, Christopher-street, Belfast.

OFFERED Nos. 111, 140, 155b, 169, 184, 203, 315, 326, 354, 355, 363, 587, 622, 812, 813, 1128, 1264, 1281, 1290, 1297, 1584, 1586, *Trifolium stellatum*, and many others, for rare or local British plants.—J. H. A. Jenner, 4, East-street, Lewes.

VOLUME of "Palaeontographical Society" for 1878. What offers? Wanted, sixth edition, "Chaffers on China."—James Griffin, 3, South Bar, Banbury.

WANTED, to purchase Smith's "British Diatomaceae" and Pritchard's "Infusoria." A good price will be given.—Apply to J. F., 11, Truro Veau-terrace, Truro.

WANTED, 78a.b.c, 106, 108, 119, 175, 202, 367b, 467, 477, 637, 701, 737, 747b, 819, 828, 839, 945, 1020, 1082, 1095b, 1255, 1484, 1507, 1631, &c., in exchange for rare plants.—G. C. Druce, Northampton.

WANTED, all kinds of unmounted Microscopical Material, in exchange for other specimens.—Alpha, 16, Brunswick-street, Poplar, E.

FOR exchange, a quantity of well-mounted histological specimens (duplicates).—C. James, 19, Vincent-terrace, Islington, N.

FOR injected Human Kidney, stained Human Intestine, *Gomphonema geminatum*, wing of Brazilian Butterfly, scale of Pollack, and Japanese grass (polariscope). Send any well-mounted Balsam Slide to J. A. Kay, Mansion-house, Brompton, Chatham.

OFFERED:—A small collection of American Birds' Skins. Wanted:—Fossil fish remains or offers.—T. Stock, 16, Colville-place, Edinburgh.

AMERICAN, Bermudas, European, British Eggs, side blown; many rarities, Eleonora falcon, Rufus swallow, Wall creeper, Phaeton flavirostris (tropic bird), Rock thrush, *Turdus cyaneus* (Eastern thrush), Alpine chough, &c., in exchange for others.—Sissons, Shanon, Sheffield.

RAKE BRITISH VERTIGOS.—Correct and well-authenticated specimens of Vertigos, *Antivertigo pusilla*, *minutissima*, *Alpestris*, *substriata*, and *angustior*, offered in exchange for really good and choice Foreign Shells, land preferred to marine; also offered, *Lim. involuta*, *Succinea oblonga*, *Unio margaritifera*, *vulvata*, *cristata*, *Balca fragilis*, *Clausilia rugosa*, var., *Schlechtlii*. Wanted, *Pupa ringens*, *Achatina acicula*, *Conovulus bidentatus*, var., *abax*, *Tectacella haliolitoidea*, *Lim. Burnettii*, and *Acme lineata*.—W. Sutton, Upper Claremont, Newcastle-on-Tyne.

WANTED, Microscopic Fungi, mounted; will exchange Crystals or other objects for the same.—A. Smith, Essex-road, London.

WANTED, Microscopic Fungi, unmounted; other Fungi will be sent in exchange.—A. Smith, Essex-road, London.

SHELLS, *Carychium minimum*, &c., for other good land, fresh water, or marine Shells, or offers.—Mrs. Skilton, London-road, Brentford, Middlesex.

BOOKS, &c., RECEIVED.

"The Geology of Ireland." By G. H. Kinahan. London C. Kegan Paul.

"The Beginning." By H. P. Malet. London: Trübner & Co. "Abstracts of the Proceedings of the Liverpool Geological Society" (from the commencement in 1859).

"American Naturalist."

"American Journal of Microscopy."

Potter's "American Monthly."

"Boston Journal of Chemistry."

"Botanische Zeitung."

"Chambers's Journal."

"Ben Bratley's Journal."

"Land and Water."

&c. &c. &c.

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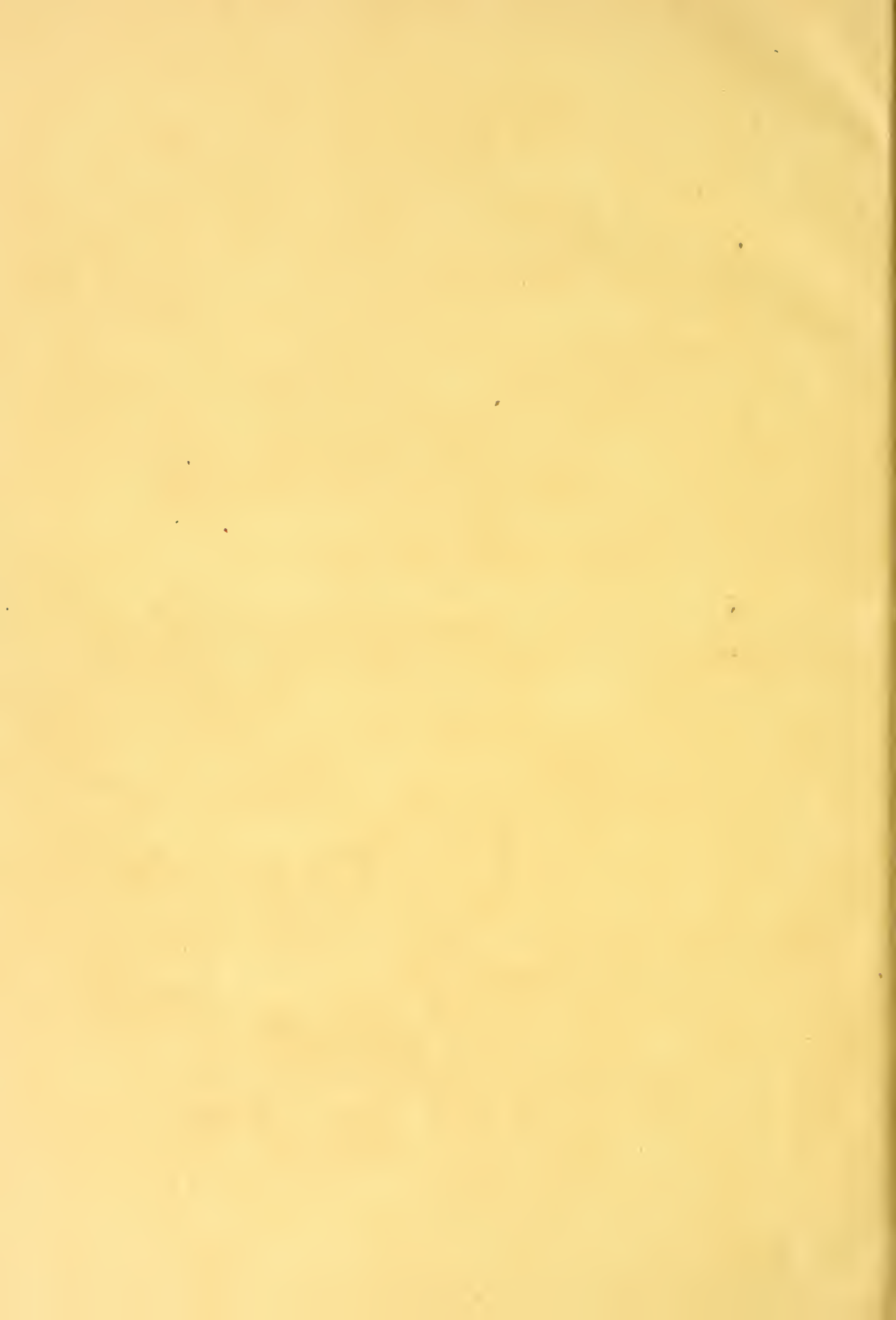
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