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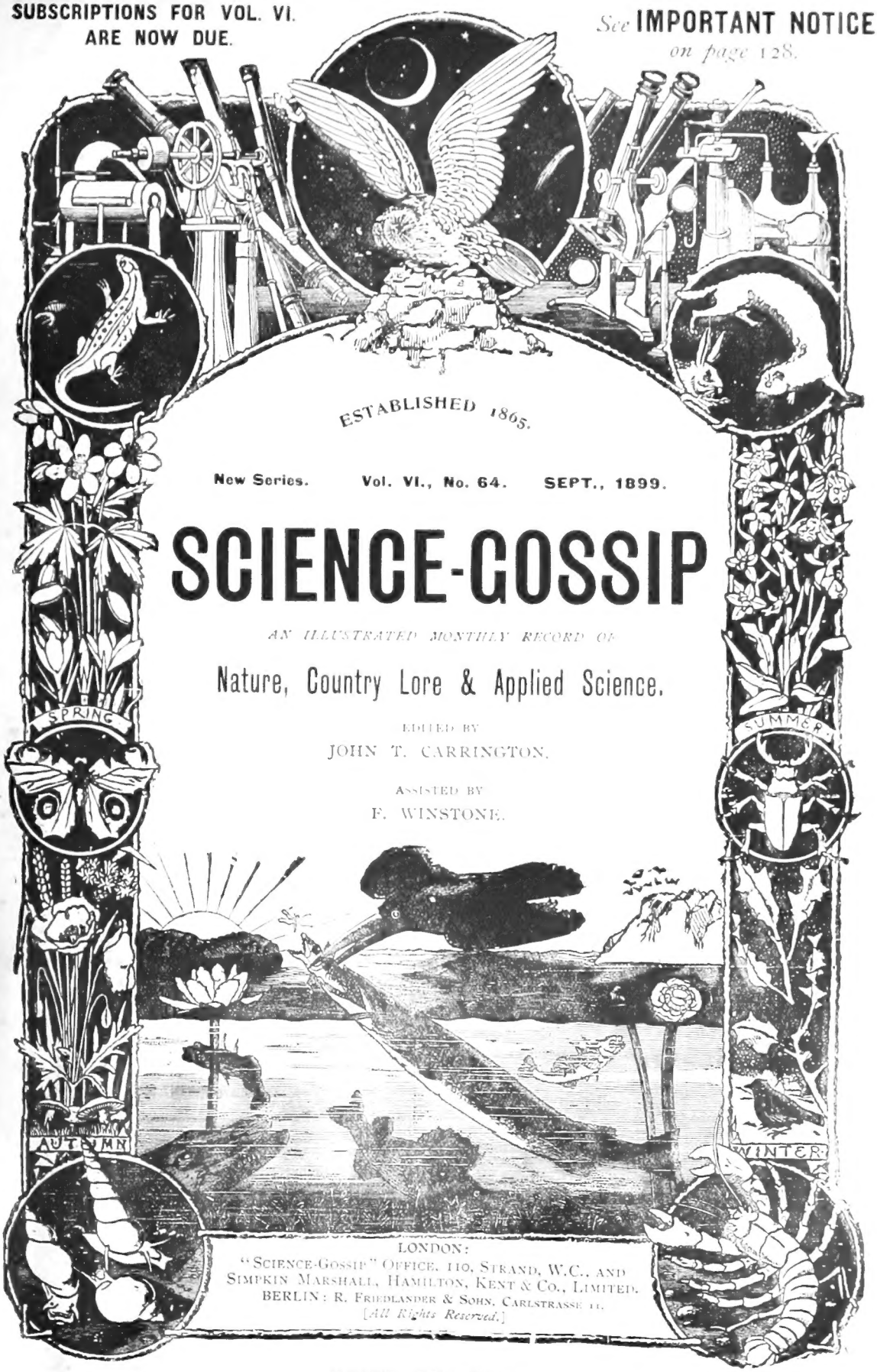

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SCIENCE-GOSSIP

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JOHN T. CARRINGTON.

ASSISTED BY

F. WINSTONE.

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SIKKIM.

By Major H. A. Cummins, R.A.M.C.

THE regions of the Sikkim Himalaya, above 8,000ft., are practically uninhabited during the greater part of the year. The climate is severe and heavy falls of snow take place preventing flocks and herds from obtaining food.

I resided for about two and a half years in the inhospitable region of Gnatong, a locality situated in the Eastern side of Independent Sikkim. This gave me an opportunity of studying the flora and fauna of the neighbourhood. Our Camp or Fort was at an elevation of 12,300ft., the barometer standing on the average about 19in. The temperature in winter descended to– 3°F, in summer it attained a height of 65°F. Fierce storms raged at certain times of the year, accompanied by thunder. On one occasion a military signaller was killed by lightning in the telegraph office. The rain and snow fall combined, registered over 180 in. The climate was excessively damp from the heavy rainfall and mantle of clouds, in which we were enveloped during the greater part of the year. The snow usually began in January, and lay until the commencement of the rains in June.

Bipang Chu Lake, Kupup Valley, Sikkim, 12,700 ft. Alt.

As already mentioned these regions are uninhabited in the winter, but about June when the snows are melting, the natives who have wintered with their flocks and herds in the lower regions ascend the hill sides to avoid the leeches which infest the jungles at that season, and to allow their cattle to browse on the young grass that shoots up, when the snow melts. Leeches are a terrible scourge, they attach themselves to any part of an animal, extracting large quantities of blood, and produce serious symptoms, especially when they gain admission to the nasal cavities as frequently occurs in sheep, cows, dogs, and others. They are also prone to attach themselves to the conjunctiva of the eye or the eyelids. At certain seasons, every leaf in the jungle seems to swarm with them, but when cold weather sets in, they soon disappear. I have not seen them above an elevation of 9,000ft.

From the month of May to the end of August vigorous vegetative activity prevailed, and one would scarcely believe the wonderful show of flowers which appear in successive crops during that period, lending to the hillsides from time to time, mantles of purple, yellow, and blue. In May and June the magnificent rhododendrons come into flower. They vary in size from a tree 30ft. in height at 8,000ft. altitude, to a mere scrub with large white or purple flowers, at 14,000ft.

Sikkim is also the country of primulas. We find *Primula petiolaris* flowering under the snow. Others such as *Primula sapphirina* and *P. glabra* occur in

thousands on the hills. They are small species, but most elegant in appearance. *Primula sikkimensis* covers acres of marshy ground, and sweetly scents the air. Gentians, swertias and potentillas are countless. Edible rheubarb (*Rheum acuminatum*) grows in quantities, and numberless plants of *Rheum nobile* are to be found on the hill sides at about 14,500ft. In the distance they resemble huge heads of the common cabbage. This plant is very remarkable. Its height is from three to five feet, and the infloresence of small greenish flowers is covered by membranous straw-coloured tracts, the whole being more or less pyramidal in shape. *Saussurea gossypiphora* is another quaint product of the vegetable world. The large composite flower is surrounded by a mass of white woolly material, the size and shape of an orange, or larger.

Sir Joseph Hooker does not mention the particular locality of which I write, but he and subsequent collectors have made such a thorough investigation of the flora of Sikkim that I only succeeded in finding two undescribed plants. One of these *Lathraea purpurea* Cummins, I collected in the Dichu valley. Since that time Major D. Prain, Superintendent of the Royal Botanic Gardens, Calcutta, informs me a great number of specimens had been brought from Iongri, a place far distant from my collecting ground.

Poppies are a prominent feature in the flora. *Meconopsis nipalensis* is ubiquitous, and has handsome yellow flowers. *M. simplicifolia* and *Cathcartia villosa* are also fine plants. Aconites are plentiful, and are said sometimes to cause the death of sheep and goats, as these animals do not recognise that the leaves are poisonous, but horses and cattle avoid such plants. The edelweis (*Leontopodium alpinum*) grows in large quantities, but I have never seen it above 13,000ft. altitude. Many species of *Pedicularis* are to be seen, some with a stem a couple of feet high, such as *P. trichoflossa*, *P. megalantha*, *P. excelsa*, etc. Other species, such as *P. tubiflora* and *P. siphonantha* are peculiar, on account of the extreme length of the corolla tube.

Butterflies and moths were very numerous, particularly at lower elevations, and the latter a nuisance at night time. At Gnatong, moths clustered round the windows in the summer. In 1893 a swarm of locusts alighted on the lower parts of Sikkim, and stripped large areas of the jungle of leaves. Some even reached Gnatong. I was told that many were seen dead on the snows of the Kinchinjunga range, at an elevation of about 20,000ft. They had succumbed to the cold when endeavouring to cross this enormous ridge of mountains.

Gnatong is about nine miles from the Jalep and Pemberingo passes. The hills through which these passes trend, reach an altitude of some 15,000ft., and can be easily ascended. The ragged tops are destitute of vegetation, except lichens. The rocks become cracked by the action of frost and huge blocks roll down the hillside or precipice, forming masses of boulders. In a particular case I remember, one block must have weighed several hundred tons. This had descended a slope for about 1,000ft. On the way down it broke into two parts. A deep rill was left on the hillside and in it could be seen species of plants differing from the normal ones of the locality. These had been carried down from above, in the catastrophe. *Salvia campanulata* Wall, was one of the plants previously absent, which appeared. It is remarkable that this plant at a high elevation (13,500ft.) possesses a purple corolla marked with yellow; while in lower situations, yellow becomes the prevailing colour.

The solitary snipe was not an infrequent visitor at Gnatong. The birds were usually seen in pairs. On one occasion during an expedition our camping ground was in a sheltered spot about 14,000ft. altitude. We saw a great number of solitary snipe, and after dark, we heard their cries around our tent. This place appeared to have been a regular haunt for them, and was no doubt their breeding ground.

On a similar trip we camped near a place called Pangola 10,720ft. altitude. Here we found foot-prints of an elephant measuring nearly 2ft. long. We traced them for several miles down the mountain ridge, until we reached a bamboo jungle in the Dichu Valley, into which they disappeared. This elephant must have been very large, judging by the marks on the trees against which he rubbed himself to remove mud from his back. He was probably a "rogue." I am not aware that elephants have been previously noted as voluntarily travelling to such an elevation. The lower parts of the Dichu Valley abound in elephants, and we saw many fresh marks of them.

The birds in the neighbourhood of Gnatong are comparatively few: the monaul, the blood, and tragopan pheasants live in the forests, which consist chiefly of *Abies webbiana*, at 9,000 to 13,000ft. altitude. The pheasants and musk deer are snared by the natives, by means of a "spring stick," that is a pliable stick with one end fastened in the ground and a noose on the other. A sapling is often used for the "stick." This is bent, the noose placed on the ground and retained by a rough spring made of a flexible branch formed into the shape of a hoop. When the animal touches this, the "stick" is released and the noose secures him by the head or leg. In order to direct animals to these snares a barrier, composed of branches of trees and underwood, is built along the crest of a hill frequently extending many hundred yards. Here and there in the fence, openings are made, and traps placed in them. The unwary deer or bird meets the obstruction, and too lazy to leap or fly as the case may be, walks by the side of the barrier and in attempting to pass the opening, which he soon finds, is quickly strung up in the air and securely held. The shooting is poor on account of this method of destroying the game.

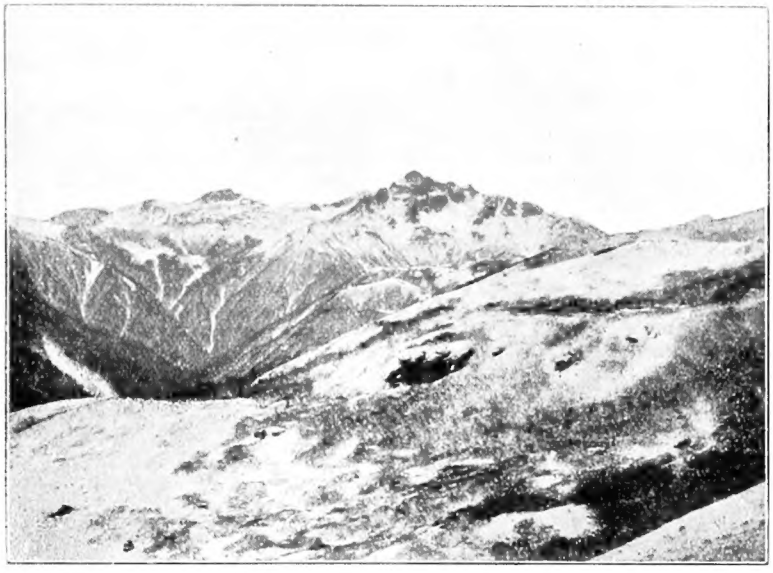
The streams in the lower parts (5,000ft.) contain many fish, but they are, I believe, seldom more than a pound in weight. The following is the method employed by the natives to catch them. The fishing line is attached to a strong rod at one extremity, and at the other to a piece of rope, the fibres of which have been frayed out. On the line near the rope, two

or three nooses of horsehair are attached, and below them a bait of caterpillars, or something attractive to the fish, is also fixed to the line. A fibre of the rope is then separated from the others and fastened to a stone of a few ounces weight. The whole is lowered into the water. The fish sees the bait and in making a dart at it, passes through the noose. The fisherman gives a sudden jerk, the rope fibre breaks, and the stone falls to the bottom, while the noose tightens on the fish, which is brought to the shore. The device is ingenious, and answers well in practice. I have seen natives make a good bag of fish in this manner.

Wild dogs which hunt in packs are said to be not uncommon. They find the track of a deer, and hunt him to the death. "Barking deer" are common at about 5,000ft. The natives systematically hunt them with dogs trained for the purpose. Like the hare when pursued, the barking deer or "khakur" is said to run in a circle. The native knows the course his quarry will take, and lies in wait armed with a bow and poisoned arrows. As the deer, driven by the dogs, passes the hunter he receives one of the arrows and soon rolls over, dead. I believe a poison obtained from the root of *Aconitum ferox* is commonly employed. If the hunter misses his aim the deer will probably have been pulled down by the dogs and killed ere he completes his circuit; and the dogs having enjoyed a feast, return home at their leisure. Bells are usually suspended from the dogs' necks to warn the huntsmen of their whereabouts. The meat of the barking deer is fairly good for eating.

Small black bears are common in the warmer parts of Sikkim. They are said to be very aggressive. One frequently sees natives bearing scars, the result of having been mauled.

Tame yāks are kept by the Thibetans for transport purposes and also for the milk they supply. Yak beef is excellent. The Thibetans drive their herds of yāks during the summer to a height of about 14,500ft., for pasturage. The yāk looks a fierce animal, but I have been in the midst of a herd of over a hundred without their showing a hostile disposition. The ordinary Sikkim cattle are much more fierce. A bull threatened to attack me and so close was he that I had my gun at my shoulder ready to fire. However a brawny Thibetan in whose charge he was, hit him with a great rock between the eyes, and he was driven off while his attention was thus distracted. Eastern Sikkim is much prized as a pasture land by Leptchas and Thibetans, and this was one of the causes of dispute which gave rise to the late Sikkim-Thibet war.



Dichu Valley, Gipmochee, Sikkim.

Sikkim is a veritable paradise for the naturalist, be he botanist, zoologist, or geologist, but especially for the botanist.

29, Nightingale Place, Woolwich.
June 28th, 1899.

New Localities for European Landshells. —Dr. Westerlund records in the "Annuaire du Musée Zoologique de l'Académie Impériale des Sciences de St. Petersbourg," 1898, p. 180, two important new localities. *Helix (Acanthinula) harpa* Say, hitherto known only from the Boreal Regions of Europe, Asia and America, and the Riffel Alps near Zermatt in Switzerland, has been found near Astrabad, Transkaspia. *Helix (Trichio) revelata*, whose Eastern Limit was considered to be 5° E. Long. finds its range extended by 15° at one bound, specimens in the St. Petersburg Museum, collected at Kiev so far back as 1849, having been referred to that species by Dr. Westerlund.—*G. K. Gude, 114, Avenue Road, London.*

HUXLEY: A REMINISCENCE.

IN the recently-issued "Reminiscences" of Mr. Justin McCarthy, M.P. (Chatto and Windus, 1899), we find an entertaining appreciation of Professor Huxley. This is the more valuable as it emanates from one who says, "I am myself entirely lacking in all culture of the field of science." We quote a portion, feeling it cannot fail to interest our readers. This sketch of the late Professor Huxley's character being the independent opinion of a layman, who is not affected by the influence of any particular scientific party, has a freshness that will appeal to those who have formed other views upon the character of this eminent leader in science. [F. WINSTONE.]

"More than a quarter of a century has passed away since the election of Professor Huxley as President of the British Association was declared by a large proportion of his admirers to be a distinct triumph of the scientific school over the orthodox school in England. I do not suppose that Professor Huxley himself regarded his election in any such light, and I believe he was far too sincere and devoted a student of science and too modest a worshipper of science to believe that a personal honour paid to himself was a rebuke to the followers of any other school of thought. But it so happened that at the time it was the fashion in England to regard the whole world of thought as divided between science and orthodoxy, and to get possessed with the idea that these were two rival forces engaged in a struggle which must end in a total overthrow of the one or the other. 'It is the struggle between light and darkness,' said an eloquent writer of the time—I shall not specify the school to which he belonged—'and one or the other must hold the world.' The writer did not seem to remember at the moment that the world had been undergoing successive and regular visitations of alternate light and darkness for as long as time had been, and that there seemed no immediate prospect of the extinction of either.

"Huxley was as delightful in society as he was powerful on the lecture platform. He was a brilliant talker, and he carried much of the spirit of the controversialist wherever he went, but as he had a keen sense of humour his controversial reply took the form of a jest quite as often as that of a direct argument. To hear Herbert Spencer and him sometimes engage in conversational controversy was something to be remembered, even by one as little qualified as myself to form any sound mental reasons for awarding the palm of debate.

"I remember one discussion, at which, however, Herbert Spencer was not present, wherein I thought Huxley showed a determined wrong-headedness such as only a great scientific philosopher could display. It was during a small dinner-party given at the house of Mrs. Frank H. Hill, and I do not know how it came about that the American Declaration of Independence rose up as a subject of conversation. Huxley suddenly declared that the opening passage of the Declaration contained a statement which was on the face of it obviously and ludicrously false. We all showed natural anxiety to learn what was the ignorant sin which this great historical document had committed. Huxley explained to us that the error lay in the opening statement that 'all men are created equal.' This he declared to be a manifest absurdity; all men, he pointed out, were not created equal. Some were born with good health, some with hereditary taint; some came into the world distorted, some of goodly shape; some were born black; some were born white. Huxley, we all knew, loved a joke and had a boyish zest for humour, not common among philosophers, and we were inclined to think that this method of criticising the Declaration of Independence was but a passing freak of humour. Huxley, however, repudiated all idea of sportiveness or levity, assured us that he was perfectly serious, and declared that to his mind it marred the whole effect of the historical Declaration when he found it thus starting off with a scientific falsehood. Some of us endeavoured to point out that the framers of the Declaration of Independence must have been at least as well aware as most other people of the time that some men were born white while other men were born negroes; that the knowledge of this fact, at all events, must have been brought clearly home to the minds of American citizens, and that probably the framers of the Declaration only meant to maintain that all men were born with a right to the equal protection of the laws. But Huxley would not admit this reading of the Declaration, which he insisted was vitiated from the very beginning by an inaccurate statement, just as the most ingenious arithmetical calculation would have been if it had started on the assumption that two and two make five. I only introduce this anecdote to show how the acutest mind may sometimes puzzle itself in a difficulty which it has itself created, and how the joy of argument may sometimes for a moment narrow the broadest intellect. One may also be allowed perhaps to feel the natural delight of inferiority on finding a superior intellect entangled in sophism.

"Huxley had, even in ordinary conversation, an intelligence so luminous that it shed light all around him on any topic which came within his range. Even where strictly political questions were concerned his judgment seemed always to sever, at once and at a stroke, the essentials from the non-essentials of any proposition and to cleave away directly to the heart of the argument. Of course there was nothing of the mystic about him. The most superficial knowledge of his intellectual form would have forewarned anyone of that, but there was also nothing of the scientific recluse about him; he had never shut him-

self in his shell; his fine perceptions were alive to all that was stirring in art and literature, in the world of politics, and in the world of society. I can hardly imagine his finding any subject uninteresting which had an interest for even the smallest section of humanity. Many a time I have thought, and no doubt others have thought, when some political controversy was going on and when Huxley found or made time to take part in it, that he would have made a great name for himself as a political debater if he had been nothing else. Although a lifelong politician myself, I could not pretend to feel any regret that Huxley had not been stolen from science and made a present to politics; but I have often felt that if Huxley were in the House of Commons he would have proved a most formidable antagonist to any ministry with whom he had felt bound to come into antagonism. His power of phrase-making was sometimes as telling as that of Disraeli; and he had not merely a power of phrase-making, but a power of discovering and exposing the central weakness of an adversary's position, which would have been of inestimable value during a great struggle in the House of Commons. It may seem a strange thing to say, but I must say it, that I cannot think of Thomas Huxley only as a great scientific man. Of course, we all know that he will go down into fame as a great illustrator of scientific questions, and this surely would be fame enough for even the most ambitious. But when I think of Huxley I cannot help thinking of him as a worker in many fields, as a man whose mind had many different spheres of thought. Huxley came readily down into the arena of public controversy, and was a familiar and formidable figure there. Wherever there was strife there was Huxley.

"Huxley was in point of fact as well as a scientific man a literary man and a writer. What he wrote would be worth reading for its style and its expression alone were it of no scientific authority; whereas we all know perfectly well that scientific men generally are read only for the sake of what they teach, and not at all for their manner of teaching it—rather, indeed, in despite of their manner of teaching it. Huxley was a fascinating writer, and had a happy way of pressing continually into the service of strictly scientific expositions illustrations caught from literature and art—even from popular and light literature. He seemed to understand clearly that you can never make scientific doctrines really popular while you are content with the ear of strictly scientific men, and therefore cultivated sedulously and successfully the literary art of expression. A London friend of mine, who has had long experience in the editing of high-class periodicals, is in the habit of affirming humorously that the teachers of the public are divided into two classes: those who know something and cannot write, and those who know nothing and can write. Every literary man, especially every editor, will cordially agree with me that at the heart of this humorous extravagance is a solid kernel of truth. Now, scientific men very often belong to the class of those who know something, but cannot write. No one, however, could possibly confound Thomas Huxley with the band of those to whom the gift of expression is denied. He was a vivid, forcible, fascinating writer. His style as a lecturer was one which, for me at least, had a special charm. It was, indeed, devoid of any rhetorical eloquence: but it had all the eloquence which is born of the union of profound thought with simple expression and luminous diction. There was not much of the poetic, certainly, about him; only the frequent dramatic vividness of his illustrations suggested the existence in him of any of the higher imaginative qualities. I think there was something like a gleam of the poetic in the half-melancholy, half-humorous introduction of Balzac's famous 'Peau de Chagrin' into the Protoplasm lecture.

"But Huxley as a rule trod only the firm earth, and deliberately, perhaps scornfully, rejected any attempts and aspirings after the clouds. His mind was in this way far more rigidly practical than that of Richard Owen. He was never eloquent in the sense in which Humboldt, for example, was so often eloquent. Being a politician, I may be excused for borrowing an illustration from the political arena, and saying that Huxley's eloquence was like that of Cobden: it was eloquence only because it was so simply and tersely truthful. The whole tone of his mind, the whole tendency of his philosophy, may be observed to have this character of quiet, fearless, and practical truthfulness. No seeker after truth could be more earnest, more patient, more disinterested. 'Dry light,' as Bacon calls it—light uncoloured by prejudice, undimmed by illusion, undistorted by interposing obstacles—was all that Huxley desired to have. He put no bounds to the range of human inquiry."

HAIRY-ARMED BAT.—The "Irish Naturalist" for August contains an article by Dr. N. H. Alcock, on "Irish Bats," in which he describes a specimen of the hairy-armed bat, while in a state of captivity. This appears to be the first time the habits of the species have been observed in confinement since 1858, when Mr. Darragh had one that lived eight days. Dr. Alcock's was a female, given to him on the 13th of February last, and he says: "for nearly a month it remained in a typical state of hibernation; but on March 11th it woke up and ate raw meat dipped in milk, not appearing in the least degree wild or shy. A few days of cold weather sent it back to sleep, then it reappeared, very lively, and with a great appetite. It always slept during the day, waking up about 8.30 p.m., when it was taken out of its cage and placed on the table. Here it ate raw meat in truly enormous quantities, and exercised itself, scurrying round the table, never attempting to fly, though occasionally falling off on to the floor. It learned to come to a pair of scissors, the clinking together of the blades serving as a 'dinner bell,' and would always walk towards one's hands, which it climbed over and finally crouched down in, apparently enjoying the warmth." Unfortunately on April 6th, it was accidentally crushed while careering round the floor, after having become a favourite with all who had made its acquaintance.

BRITISH FRESHWATER MITES.

By CHARLES D. SOAR, F.R.M.S.

(*Continued from page* 80.)

GENUS *HYGROBATES* KOCH, 1835-41.

THIS genus according to Piersig contains five species. A much larger number had at different times previously been named, but Piersig proved them to be the same mites under different names, and therefore reduced the number to five. In Britain at present there appears to be only three species. I have had a very large number through my hands from different localities, both my own collecting and from friends; but can find only two species. There are numbers of variations. No two seem to be exactly alike. They vary a great deal in proportions, no doubt due to the chitinous parts of the mites being nearly fully developed at the time they leave the inert stage preceeding the imago, the soft parts only being left to grow. This growing gradually alters the arrangement and position of the epimera and genital plates by pushing the chitinous parts further apart, and thus altering the appearance of the ventral surface. I mention this fact because it gave me much trouble, as I had to make a number of drawings, before I could be satisfied the specimens were all the same species. I do not think there is any doubt about it, and hope these remarks will save others working at this genus, some of the labour I have expended to arrive at this conclusion.

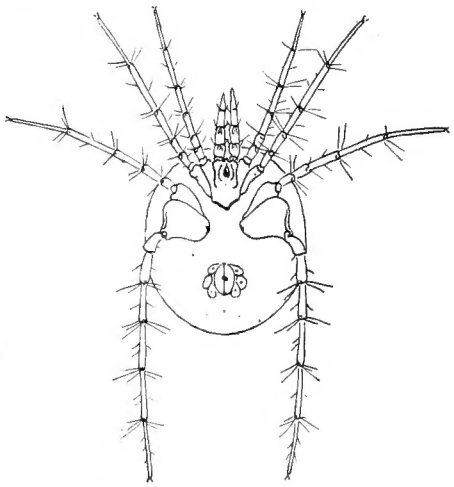


Fig. 1.—*H. longipalpis*, FEMALE.

The mites belonging to the genus *Hygrobates* are characterised by having the body soft skinned. Legs sparingly supplied with hairs. Claws to all feet. Eyes wide apart. Epimera arranged in three groups. Three comparatively large discs let into each genital plate.

1. *Hygrobates longipalpis* Hermann, 1804.

FEMALE.—Body: (Fig. 1.) Oval in form, sometimes slightly flattened on the anterior margin. Length about 2.0 mm. Width about 1.60 mm. Colour yellow with dark brown markings on dorsal and ventral surface. Over, and in, these brown markings run a quantity of coloured streaks, or veins, of a very light yellow or sometimes white tint. If a tube containing several of these mites is held up to the sunlight they are seen to be of a very brilliant colour. Eyes, pink.

LEGS.—First pair about 1.23 mm., fourth pair about 1.72 mm. They have a number of bristles, or stiff hairs, on each leg (fig. 1), but are quite without the long swimming hairs at the joints, we noticed in *Curvipes* and *Limnesia*. Nevertheless they are quick and strong swimmers, as it is necessary they should be, for I have sometimes taken them in very rapid streams. In colour the legs are a pale blue.

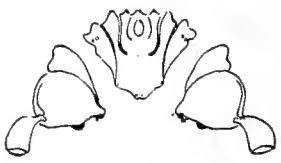


Fig. 2.—*H. longipalpis*, EPIMERA.

EPIMERA.—Forms three groups. The centre group is formed by the first two pairs being jointed on to the plate which holds the mouth organs as seen in fig. 2. In colour they are pale blue, as are all the chitinous parts of this mite. I say all the chitinous parts, but it is well to note I have taken some specimens with the legs and epimera quite colourless, and others with these parts a pale yellow, though pale blue seems to be the predominant colour.

Fig. 3.—*H. longipalpis*, PALPUS.

PALPI.—(Fig. 3.) Is about 0.72 mm. in length This varies in different specimens, but I find the size given is most usual. There are two short bristles, close together, about the centre, on the bow side of the penultimate segment of the palpi, which differentiate this from the next species.

GENITAL AREA.—(Fig. 4.) I have drawn half the area here, one plate only showing the three discs, which is repeated on the other side.

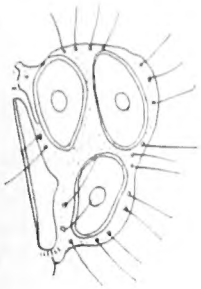


Fig. 4.

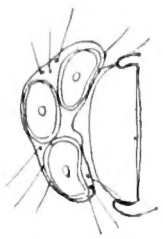


Fig. 5.

H. longipalpis.

Fig. 4.—GENITAL AREA, FEMALE. Fig. 5.—GENITAL AREA, MALE.

MALE.—Is, as usual, a little smaller, but exhibits no difference in structure except in the genital area. Fig. 5 will show the plate of the male drawn from one side only.

LOCALITIES.—Common everywhere. Found both in ponds and streams, more often in streams. Mr. Taverner found them in Scotland, and Dr. Freeman in his list of mites records it from co. Dublin and reports them as common in Ireland.

(*To be continued.*)

ARCHEOLOGY IN DERBYSHIRE.

AT a recent meeting of the British Association it was decided to include archeology among the sciences. It is not, therefore, necessary to give any excuse to our readers for the following short account of the proceedings of the British Archeological Association, during the 56th Congress, held this year at Buxton. Space will not permit of a detailed description of the various churches, earthworks and other places of interest visited by the Society nor of the papers read by members at the evening meetings, but one or two connected with the early history of man are especially suitable for notice in this magazine. I will especially mention a visit paid to Arbor Low, a circle of stones situated on the hills near Parsley Hay Station. This is one of the earliest, in fact, according to some authorities, the most ancient monument of the kind in Britain. It has fortunately been protected by Sir John Lubbock's Act for the preservation of ancient monuments. Dr. Brushfield, F.S.A., who described the circle, said the word "low" was usually understood to mean "high," but it was really Saxon for "barrow." In this case, the barrow is supposed to have been a temple of early neolithic times, probably erected over the remains of some chief, or fighting man, famous in his day and venerated after his death. It is surrounded by a bank having the ditch inside the circle; which is very unusual. Near the centre is a circle of stones thirty-two in number, the largest being about ten feet in length, but they are slabs, not blocks. In the midst was a cromlech or dolmen. About three hundred and fifty yards away outside the fosse, on Gib Hill, while investigating a supposed tumulus, a cistvaen was found with other remains of the neolithic period, such as worked flints and spear heads. There was some discussion as to the reason of the Romans having made a road within a short distance of Arbor.

At one of the evening meetings the Rev. H. Dunkinfield Astley read a paper on jet and cannel coal ornaments and slate implements, illustrated with numerous drawings of a crannog at Dumbuck, and a very good exhibition of objects found there. After an exhaustive survey of these ornaments and implements the lecturer compared them with those still in use among people in a neolithic condition of culture. He was of opinion that the Dumbuck crannog is a monument of the later Stone Age.

Mr. J. C. Gould conducted the party to the earthworks on Castle Hill overlooking Bakewell. This he pointed out was never a castle, but a good example of an Anglo-Saxon earthwork. The outer line of fortifications of the "ballium" and the central mound, which corresponds to the Norman keep, are distinctly visible. A charming view of the country is obtained from this mound, doubly interesting because every one of the hills around, have prehistoric remains in the shape of barrows. It is supposed that a plateau a little distance up the valley, cut out on one of the hillsides was an ancient "moot-place" where the men of the village, or "tun"=town, met to settle their affairs. Mr. Gould also read a paper on Defensive Earthworks in which he fully explained the importance of these defences in early days. The pre-Norman Crosses of Bakewell, Eyam and Hope are marvels of workmanship and artistic design when one realises the absence of suitable instruments for construction. That at Eyam was the most interesting both on account of its bas-relief sculpture and excellent state of preservation. Eyam was the village visited by the plague in 1666, when the spread of infection to the surrounding neighbourhood was only saved by the intrepid courage and advanced thought of the vicar, Mr. Mompesson. He arranged a system of isolation so perfect that for one year, the infected village had no communication with the adjacent district, food being placed by the neighbours at a certain distance. The register of those who died is still to be seen in the church, amongst the names being that of the vicar's wife.

At the final meeting held in the afternoon of July 22nd, it was announced, that as one of the results of the congress, it was proposed to form a Field Club for Buxton and the neighbourhood. Mr. Blashill, the hon. treasurer, who was in the chair, in replying expressed great satisfaction that a Field Club was to be formed, as he pointed out the pleasure and profit of field rambles would be greatly enhanced on the part of the naturalist by a knowledge of Archeology, and on that of the archeologist by an acquaintance with Natural History.

F. Winstone.

COLLECTION AND PREPARATION OF FORAMINIFERA.

By Arthur Earland.

(*Continued from pages* 54 *and* 74.)

FOR the successful preparation of the material,(1), whether freshly gathered or not, it must first be thoroughly dried, using a very moderate degree of heat. Great heat has a tendency to crack the foraminifera, and also deprives the hyaline specimens of their glassy transparency, turning them milky white. After drying, the material is passed through a very coarse sieve of 10 or 12 meshes to the inch in order to separate the larger fragments, stones, mollusca, &c., from the foraminiferous sand. Very few of our British foraminifera, except the parasitic forms, will be found among this coarse residuum, but it should nevertheless be carefully examined with a pocket lens for abnormally large specimens. If the material, however, is from tropical seas or from deep water, the coarse residuum will often be found to consist very largely of more or less perfect foraminifera.

If the quantity of sand is small, the collector may proceed to float it without further preparation; but if a large quantity is to be dealt with, it will be found advantageous to pass it through a succession of sieves in order to separate the material into parcels of varying sizes. This will be found to facilitate the floating operations by ensuring that all the particles are of approximately equal weight.

The floating operations should be performed at a sink, a liberal supply of water being required, and if possible by daylight, as it is easier to judge how the process is going on than by artificial light. The tripod (fig. 1), containing a sieve covered with the finest gauze (120 mesh wire or preferably 150-mesh silk) is placed in the sink, the gauze being first thoroughly wetted to facilitate the draining away of the water. The glass jar is then nearly filled with water, and two or three tablespoonsful of sand poured in. If the material is coarse the sand sinks immediately, followed in the course of a few seconds by the greater number of the foraminifera. If the jar is held up between the eyes and the light, the falling grains can be observed, and at the right moment the bulk of the water containing nearly all the forams in suspension is poured quickly into the sieve from which the water drains away. The purity of the material gathered in the sieve depends entirely upon the judgment with which the operator has timed his actions; but practice is all that is required to obtain good results. The residuum left in the glass jar will still contain many foraminifera, principally those specimens which are too heavy to float. This is washed out into a large basin or jar for later treatment, and the previous operation repeated with a fresh supply of sand, until the "first floatings" have been separated from the whole of the material. The time allowed for subsidence will of course vary with the size of the particles, so that in the case of the finest grades of material it may amount to a minute or more. The actual time can only be settled by the judgment of the operator, who must decide by watching the falling material in a strong light.

In the case of the finest siftings of sand the tension of the surface film is so great, that unless the particles are thoroughly wetted the sand grains float as readily, or rather take nearly as long to sink, as the foraminifera. This difficulty may be overcome by shaking up the contents of the jar, covering up the top with one's hand to prevent the water splashing out, or even by putting the sand into the jar before filling up with water.

When the whole of the material has been treated in the manner described and illustrated on page 54 in July Science-Gossip the foraminifera may be extracted from the residuum which had been put aside in a jar, and which will be found to consist almost entirely of sand. Take a flat dish or pan with fairly straight sides, and a spout. A half-plate photographic developing dish answers as well as anything I know. Into this put about a teacupful of the sand, covering it to a depth of about three-quarters of an inch with water. If the dish is then gently rocked with combined up and down and circular motion, the foraminifera will rise in suspension in the water. By careful manipulation they may be worked towards the corner of the dish, when a sharp tilt empties them into the sieve. The operation should be repeated two or three times, until the whole of the foraminifera have been separated from the sand, which after a brief inspection, to ensure that no specimens of importance are left in it, may be thrown away.

The material has now become very much less in bulk, the reduction depending upon the amount of sand included in the original gathering. The contents of the sieve which I may call "First Floatings," though consisting principally of foraminifera will be found to include organic and inorganic debris of many kinds; such as fragments of mollusca, bryozoa, hydrozoa, ostracoda, sponges, seaweed, coal and coke dust, mica, etc. If the material is intended for study and selection only, the cleansing process need not be carried any farther; but if it is intended to be mounted as spread slides, it will be necessary to eliminate the greater part of these foreign substances by a further process of floating, or in some cases by repeated flotations.

The first floatings should be thoroughly, but slowly, dried, and a few teaspoonsful stirred up again in the glass jar which should be filled with water almost to the brim. Some minutes having been allowed for the material to settle, the floating portions may be

(1) By an unfortunate oversight of the printers, this portion of Mr. Earland's article was omitted last month. It should be read on from end of p. 54 (*ante*).—(*Ed. S.-G.*)

removed with a spoon if they are sufficiently abundant, washed off into a small sieve and slowly dried. If the floats are scanty they are best separated from the water by carefully pouring it off into a glass funnel placed over a small sieve, or by means of ungummed cigarette papers which are dropped on the surface of the water and to which the floating foraminifera adhere. The papers must be carefully lifted off by one corner, and after drying, the forams may be brushed off into a tube. The material which has sunk to the bottom of the jar consists of the heavier foraminifera, ostracoda, etc. This should be preserved for selection.

If the first floatings contain much animal or vegetable matter, as is frequently the case, they should be boiled in a strong solution of caustic potash, which will remove this, without damaging the foraminifera. The quantity of floatings obtainable from a gathering and their condition of freedom from extraneous matter varies very greatly. Some gatherings will be found to yield an abundant supply of pure foraminifera at the first floating, while in other cases it is necessary to repeat the operation several times to procure satisfactory results.

The foregoing methods are intended for the preparation of recent sandy materials. When the material is in the form of dredged mud, a preliminary process is necessary to remove the fine matter, as if the water is turbid and opaque it becomes very difficult to judge the moment for pouring off the floats. The mud must be broken up into lumps about an inch in diameter, and thoroughly, but very slowly, dried. It is then placed in a basin and covered with water, which quickly disintegrates the lumps. A few foraminifera floating during this process may be removed with cigarette papers. The mud is then washed out by placing the material, a spoonful at a time, in a sieve covered with fine silk gauze, through which a gentle stream of water is allowed to flow until it passes through quite clear. The muddy water should be allowed to settle in a bath and the solid portion then scraped out and thrown away, as it will probably cause a stoppage of the waste pipes if allowed to run down the sink. The residuum left in the sieve should be thoroughly dried, and may then be picked over on a tray under the microscope, or if desired the floatings may be separated in the manner already described.

Foraminifera have existed from the earliest times, and from the Silurian downwards there are probably few marine formations which would not yield them to the diligent worker. Until we reach the Cretaceous period they are, however, few in number and difficult to obtain, except in sections. From this period to the present day they may be found in nearly all marine deposits. The state of preservation varies considerably, those from clay formations being usually in the best condition. Owing to the infiltration of mineral matter, it is, as a rule, impossible to obtain floatings from fossil material; although in exceptional cases, sandy gatherings such as the Crag, will yield some floating forms. Clays and shales may be treated in the same manner as dredged mud, the material generally breaking up under the action of water, if it has been thoroughly dried. If the residuum in the sieve is still muddy after washing, it may be dried and washed again. This second drying is generally successful.

Glenwood Road, Catford, S.E.

Botany at Hunstanton.—Have lately been at Hunstanton north-west of Norfolk. The neighbourhood is rich in plants which inhabit fens, salt marshes, and chalky soils; but perhaps the most interesting spot is at Gore Point, three-and-a-half miles north of Hunstanton Pier. There, between the cultivated land and the sand-dunes, is a tract of salt marsh which is famous for two rarities, viz., *Suaeda fruticosa* and *Statice reticulata* Linn., called by some authors *S. caspia* and *S. bellidifolia* by others. This station is also famous for the beauty of colour displayed by a vast bed, perhaps five acres or more, of *Statice limonium*, the common sea lavender, which is in its glory all through the month of August. The rich purple carpet is a very striking and lovely object, the colour being rather brighter than that of the purple heather. The bulk of the colour is due to the large panicles of *S. limonium*, but a good deal of the smaller *S. auriculaefolia* is there also, chiefly in the drier spots, blooming at the same time, while abundance of *S. reticulata* may be found here and there, but its small pale flowers look as if they were withered beside the richer hues of its compeers. Mixed with the sea lavender are *Triglochin maritima*, *Salicornia herbacea*, the rarer *S. radicans* in thick clusters, with creeping rhizomes, *Aster tripolium* var. *discoidea*, *Glaux maritima* and *Suaeda maritima*. On the drier borders of the marsh are *Frankenia laevis*, *Suaeda fruticosa* and *Glyceria maritima*, and on the sand-dunes *Psamma arenaria*, *arenaria peploides*, *Convolvulus soldanella*, and *Eryngium maritimum*.

The Sea Holly (*Eryngium*) is particularly fine here, and wonderfully blue. I noticed that the central flower-heads of this plant were nearly always green, while those on the branches were of a bright lavender blue; and seeing that only styles were visible on the green heads, while the coloured stamens were conspicuous on the blue ones, I fancied at first that the plant must be monoecious; I believe however that the central heads had dropped their blue corollas and stamens, while the younger heads on the branches had just opened. This, however, implies that the primary inflorescence is cymose and not umbellate, if, as Syme states, the branches in this plant represent the primary umbel. Perhaps however that is a mistake, as it is in accordance with a frequent if not a universal rule among the Umbelliferae for the central or truly terminal umbel to open first.

Opposite to Gore Point there is exposed at low water a green bank which looks at a distance like a ridge of grass. It is really covered with a green alga, *Ulva*, with narrow undulated fronds from one to two feet long. A variety of other Seaweeds are cast up here on the sands.

On the Hunstanton Cliffs the most conspicuous plants are *Centaurea scabiosa*, *Scabiosa arvensis*, *Anthyllis vulneraria*, *Reseda lutea*, and *Lunaria vulgaris*. In a street at King's Lynn I met a small girl wheeling a big barrow full of *Salicornia herbacea*. On asking her what she was going to do with it she answered wonderingly, "Boil it and eat it like cabbage. Its sampher." I did not know that it was so used. It is not of course the true rock samphire (*Crithmum*) but it is known in some parts as marsh samphire, and was formerly burnt to extract the soda which it contains. *F. T. Mott, Crescent House, Leicester, August 7, 1895.*

TICKS AND "LOUPING-ILL."

By E. G. Wheler.

(Concluded from page 50.)

IXODES PLUMBEUS. (?) *I. HEXAGONUS* var. (?)

AT the time of the attack of *I. reduvius* on the sheep, large quantities of ticks were present on the shepherds' collie dogs. Being assured that these never reached the size of those on the sheep, they were examined, and it was at once evident that they were of a different species. Its right name is doubtful. Professor Neumann, to whom I am indebted for kindly assistance, assures me that it is a variety of *Ixodes hexagonus*, but there seem so many differences between the specimens to which he assigns this name, that I hesitate to think further investigation is unnecessary.

The name of *I. plumbeus* was assigned to it on

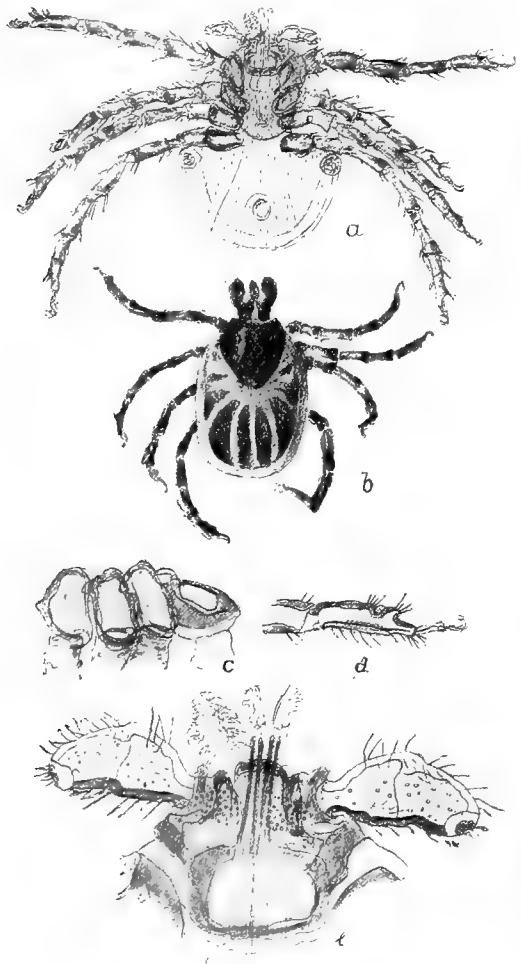


Fig. 14.—*Ixodes plumbeus*. ♀ *a* (in balsam). *b* dorsal aspect. *c* coxa of fore legs. *d* tarsus of fore leg. *e* capitulum enlarged.

Fig. 15.—*Ixodes plumbeus*, in balsam. *a* larva. *b* capitulum enlarged. *c* fore leg. *d* pupa. *e* capitulum enlarged. *f* coxa of fore leg.

examination of named specimens at the British Museum, but these were so old and discoloured, that no very reliable information could be obtained. In nearly all cases females had been preserved, and there is so much general similarity in the appearance of

with five hooks. Palpi short and thick. Spiracles moderate. (Fig. 14.)

When distended the female loses the intestinal markings, and turns first a drab, and finally livid or lead colour.

Fig. 16.—*Ixodes hexagonus*, mounted in balsam. *a* rostrum enlarged. *b* palpus. *c* coxa of fore leg.

distended females of different species, and so much diversity between individuals of the same species in different stages of distension, that much confusion in nomenclature has arisen.

This tick, which is very common, appears to have one essential difference in habit from *I. reduvius*, which is that no males could be found with the females on the host. So far, I have altogether failed to secure a specimen of the male. The life history of this tick is probably very different from that of the grass-tick. It must be chiefly passed in the interstices of boarding, floors, walls, and other parts of kennels inhabited by the host.

The eggs are nearly white, length 52 mm., breadth 42 mm. The number laid appears much fewer than in *I. reduvius*. In no single case was this tick found on the sheep.

The drawing and description of the female were taken from a solitary undistended specimen, all the others obtained, some scores in number, being partially distended. The larvae described were hatched out in confinement. No specimen of an undistended pupa was obtainable.

Adult Female.—Length 2.86 mm. to 6.50 mm. when distended. Colour of body light brownish grey, with eight large brown radiating intestinal marks; two other small ones being nearly concealed by the shield. The body somewhat obscurely margined. Head, shield and legs light pale testaceous. Four slight posterior indentations on margin of body. Coxae of anterior legs are short and triangular. They have no distinct spine, but merely a tubercle. The second and third pair also have small tubercles. Rostrum with eight large barbs and corona. Chelifers

Proportionate measurements.

Length 136	Rostrum 16	Palpi 22		Spiracles 12		Shield 54					
Breadth 90	,, 8	,, 10		,, 12		,, 48					
Legs (1st)	....	L	24	12	24	22	22	28			
		B	16	12	12	10	9	8			
(2nd)	....	L	22	14	20	18	16	22			
		B	12	11	10	9	8	7			
(3rd)	....	L	22	14	24	20	20	24			
		B	12	10	9	9	8	7			
(4th)	....	L	20	20	30	24	24	28			
		B	16	10	9	9	9	8			

Larva.—Length 0.74 before distension. Body transparent, with four faint radiating intestinal marks—not always present. Other parts pale testaceous. Rostrum 8 barbs, chelifers 4 hooks. Claws extend beyond the caruncles of feet. (Fig. 15, *a*, *b*, *c*.)

Length 40	Rostrum 6	Palpi 8		Shield 16							
Breadth 28	,, 3	,, 3		,, 14							
Legs (1st)	....	L	6	4	6	6	6	10			
		B	5	4	4	3	3	4			
(2nd)	....	L	6	4	5	4	4	8			
		B	5	4	3	3	3	3			
(3rd)		L	6	5	5	5	5	10			
		B	6	4	3	3	3	3			

Pupa.—Length 3.10 mm. when distended. Legs shorter and thicker. Rostrum with 8 barbs, chelifers four hooks. Colour when distended, livid almost black. (Fig. 15, *d*, *e*, *f*.)

Length	Rostrum 8	Palpi 11		Spiracles 6		Shield 28					
Breadth	,, 4	,, 5		,, 6		,, 24					
Legs (1st)	....	L	8	5	9	8	8	14			
		B	8	6	6	5	5	5			
(2nd)	....	L	9	6	8	7	6	11			
		B	8	6	4	4	4	4			
(3rd)	....	L	10	6	9	8	8	12			
		B	8	6	4	4	4	4			
(4th)	....	L	8	6	10	8	8	13			
		B	7	5	4	4	4	4			

IXODES HEXAGONUS, Leach. *I. AUTUMNALIS* (?), Leach.

Several specimens of this tick have been received. They were found on stoats, ferrets, and hedgehogs. Professor Neumann names it *Ixodes hexagonus*, after Leach. An examination of Leach's type specimens at the British Museum led to the conclusion that it was his *Ixodes autumnalis;* but the specimens, as above said, were too old to depend upon. All the

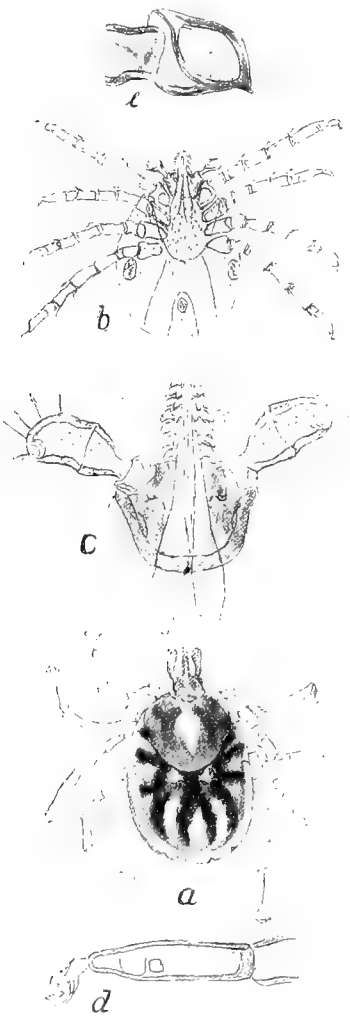


Fig. 18.—*Ixodes hexagonus.* Length 1.70 mm. *a* dorsal aspect. *b* in balsam. *c* capitulum enlarged. *e* coxa of fore leg. *d* tarsus of fore leg.

individuals received were partially-distended females, and distended larvae and pupae. Some were sent to me by Mr. Pocock on February 7th, and were kept alive on damp sand and moss in the usual way. On April 29th, after eleven weeks and four days, it was discovered that two of the larvae had undergone their metamorphosis, but one larva remained unchanged. Whilst the total length of the ticks is little altered, other considerable changes have taken place. The shield is greatly enlarged, the rostrum and palpi lengthened, and not only has the fourth pair of legs appeared, but the others are much developed. A con-

Fig. 17.—*Ixodes hexagonus.* ♀ partly distended.

siderable alteration has also taken place in the intestinal markings, which seem to have reappeared in the larva (previously all black), as the time of metamorphosis approached. The exact day on which it occurred was not observed. Distended ticks in all stages become very sluggish, attempting to escape notice by feigning death; but in this case, so soon

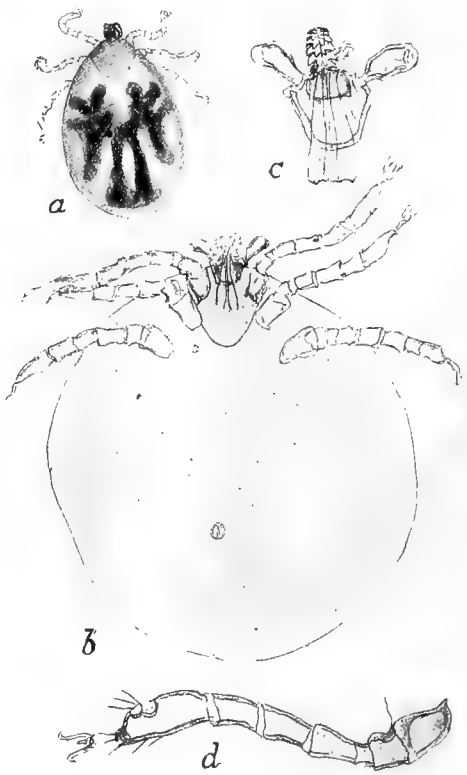


Fig. 19.—*Ixodes hexagonus.* *a* larva, fully distended dorsal aspect. *b* in balsam. *c* capitulum enlarged. *d* fore leg.

as the change had taken place, the young pupae recovered their active habits, clinging tenaciously to every moving object.

Adult Female. Length (when slightly distended) 3.80 mm. 16 to 11 mm. when fully distended. Shield and spiracles moderate in size, former finely punctuate. Rostrum extending beyond palpi, which are short and broad. It is armed with ten large barbs and corona. Chelifers with five hooks. Coxae of anterior legs with small spine. Body finely hirsute. Head, shield, legs, etc., testaceous. Body when slightly distended drab (fig. 17), developing to lead colour when filled with blood.

Length	72	Rostrum	4		Palpi	7	Shield	18
Breadth	42	,,	3		,,	3	,,	16
Legs (1st)			L	6	4	6	6	6	10*
			R	6	4	4	4	4	4
(2nd)			L	8	4	6	5	4	8
			R	5	4	3	3	3	3
(3rd)			L	8	5	6	6	6	9
			R	6	4	5	5	5	5

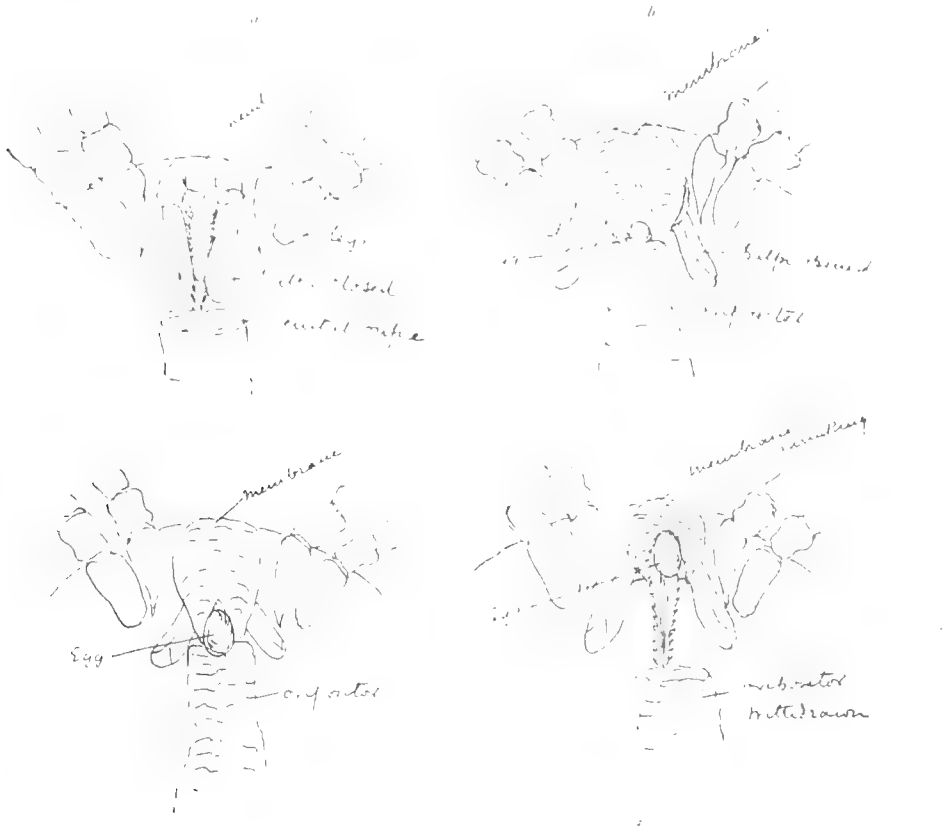


Fig. 20.—*Ixodes reduvius*. Action of Ovipositing. (See page 110).

Length	204	Rostrum	20	Palpi	28	Spiracles	21	Shield 80
Breadth	132	,,	10	,,	13	,,	20	,, 72
Legs (1st)			L	32*	16	28	20	28	36
			R	22	14	14	14	12	14
(2nd)			L	28	16	24	20	20	28
			R	20	18	12	12	10	8
(3rd)			L	30	20	28	24	22	28
			R	24	14	12	12	12	10
(4th)			L	28	24	38	32	28	36
			R	20	14	14	13	13	10

Larva.—Length undistended 0.88 mm. to 1.76 mm. when fully distended. Body light, translucid, becoming dark when replete. Shield, legs, etc., very pale testaceous. Coxae of anterior legs with very small tubercles. Rostrum with seven barbs. Caruncle extends as far as claws of forefeet. Body with very similar intestinal markings. Legs, capelulum, etc., dark testaceous. When fully distended and about to undergo metamorphosis the intestinal markings are as shown on fig. 19 *a*.

* Includes 6 for length of spine.

Pupa.—Length 1.76 mm. to 3.03 mm. when distended. Body light bluish grey, margined, transparent, with four posterior large intestinal marks, joined together behind the shield, and smaller ones extending to the front and sides, visible through the shield. Uniform brownish white when distended. The shield, legs, head, etc., pale testaceous. Coxae of anterior legs with a small tubercle, or embryonic spine. Rostrum with seven barbs. Chelifers with four hooks, fig. 18, *a*, *b*, *c*, *d*, *e*.

Length	80	Rostrum	8	Palpi	12	Spiracles	8	Shield	28
Breadth	48	,,	6	,,	5	,,	7	,,	28
Legs (1st)	....	L	12	8	12	10	10	16	
		B	8	6	6	5	5	4	
(2nd)	....	L	13	7	10	8	8	14	
		B	6	5	5	5	5	4	
(3rd)	....	L	14	8	12	10	8	14	
		B	8	6	5	5	5	4	
(4th)	....	L	12	10	12	12	10	14	
		B	8	6	5	5	5	4	

It will be seen that the chief differences are the larger size of body, shield and rostrum, the number of barbs on the latter, and the presence of a spine on the coxae of the fore legs. Also the fact that the *I. plumbeus* (?) were all taken from dogs; whereas, *I. hexagonus* was found on ferrets, stoats and hedgehogs, though to this but little importance must be attached.

IXODES REDUVIUS additional notes (*vide* S.-G. *ante* 5).

Since commencing these descriptions, an opportunity has occurred of observing the oviposition of eggs by the female, which is most remarkable. The head, which in the more youthful stages is carried horizontally, is in the distended female held more or less at right angles to the body. When about to lay an egg, the head is further inclined till it rests close up against the breast (fig. 20*a*). In this attitude the end of the rostrum actually touches the genital orifice. The palpi are at the same time widely opened out, though for what purpose is not apparent. Behind the head, and from under the shield, at what (for the purposes of explanation) may be described as "the back of the neck," a white, perfectly transparent, delicate gelatinous membrane is protruded by inflation with air, or a transparent fluid, over the head, which it entirely conceals. The end of this membrane terminates in two horns, or "fingers." It appears covered with a glutinous secretion. At the same time, an ovipositor of a very similar character, but not quite so transparent, is pushed out from the genital orifice (fig. 20*b*). This latter is a tube, within which is the egg. As it projects, this tube turns itself inside out, like the finger of a glove, leaving the egg protruded at the end. The egg is then seized by the two "fingers." The membrane from behind the head, and the ovipositor are then both mutually withdrawn (fig. 20*c*). The egg adheres to the former, which drags it forward to the top of the head, where it is deposited as the membrane collapses, owing to the withdrawal of its contents (fig. 20*d*).

This membrane in its action closely resembles the toy dolls of thin indiarubber, which are blown up, and collapse when the air pressure is removed. The time occupied in depositing an egg was three minutes, and the period between the laying of two eggs about six minutes. The eggs measure 53 mm. by 38 mm.

A paper describing the oviposition by a foreign tick was read by Mr. R. T. Lewis before the Royal Microscopical Society, on May 18th, 1892. There are some points of difference, attributable no doubt to the difference of species.

The foregoing notes are merely the collection of personal observations made during the past twelve months, and are therefore necessarily most imperfect.

The object of publishing them has been to call attention to a very interesting and important subject. It is hoped that others more accustomed to scientific research will take up the question, especially with reference to the obscure conditions which cause susceptibility to louping-ill in some cases, and immunity in others.

A complete and careful classification of the British ticks and allied genera, as well as descriptions in all three stages of their existence is much needed to assist those who may desire to investigate the life history of these pests, the want of which has been the occasion of much confusion in the past.

Swansfield House, Alnwick,
August, 1899.

ALBINISM IN FLOWERS.—It may be desirable to explain more fully the subject-matter of my remarks on Albinism in Flowers (vol. v. 250 *ante*). I will endeavour to do what is not very easy within the limits of a short note. It has been stated that (1) white-flowered specimens seem as healthy and vigorous as those of the usual colour. They may appear so, but their vital powers and processes are really not so active and complete. (2) Is the whiteness permanent? I should think not, but will refer to this later. (3) As the pigments are derived from the soil, how is it that a white-flowered plant will grow on the same soil and the same spot as those of the usual colour? As far back as 1832, the great De Candolle was obliged to declare that "the opinion long prevalent that red flowers owe their colour to an oxide of iron appears without foundation." There is, however, still a wide-spread and popular belief that the floral pigments are derived from the soil. One correspondent writes me to know why I said the flowers of meadow-sweet ought to be red; also, if dryness is proper for the plant, why it grows in wet localities? What I meant by "they ought to be red," is that there is an abundant sufficiency of chromogen in the parts concerned, but owing to the moist surroundings it does not in this particular species develop into red pigment. Under unusual circumstances this flower has, however, actually been observed to be red, like many of its allied species. My observation that "there are no absolutely white flowers," seems to have surprised many people. The proposition may be a little too strong; but overlooking older authorities, I will translate the words of M. Gillot, of the Botanical Society of France. He says, "It is, in fact, very rare that the white of the petals is absolutely pure; in most cases there exists a yellow, blue, or red colouring matter in very minute quantity, which can be detected only by the help of a close observation or of artifices such as withdrawal by an air-pump of the air which fells the intercellular spares, and contributes to make the organ appear white; its true colour can then be recognised." A deficiency of phosphorous in the soil, on the one hand, and a deficiency, on the other, of that suction force which is especially incidental to flowers borne on specially long stalks would, combined or singly, directly and indirectly, give occasion for abnormal phenomena, such as doubling, albinism, etc. I think from my own observations that annual plants habituated to damp habitats are especially liable to lose a good deal of this normal transpiratory activity.—[*Dr.*] *P. Q. Keegan, Patterdale, Westmoreland.*

BUTTERFLIES OF THE PALAEARCTIC REGION.

By Henry Charles Lang, M.D., M.R.C.S., L.R.C.P. Lond.

(Continued from page 38.)

WE now come to the enumeration of the butterflies of the Palaearctic Region. I have already indicated the system of classification, which will be used. The method of description will be based on that of the late Henry T. Stainton in his well-known Manual of British Butterflies and Moths. This work has never been surpassed for convenience and conciseness. The following abbreviations will be used throughout :—

Size will be expressed in millimeters, and printed "mm." indicating the distance between the apices of the fore wings. When two measurements are given, separated by a dash, it is meant that the insect varies in size between the two dimensions. Thus, *Anthocharis cardamines* L., 34-43 mm.

♂ means male ; ♀ female.
hybr. hybrid between two species.
ab. before a name aberration.
var. variety.
f.w. = fore wings.
h.w. = hind wings.
u.s. = underside.

The upperside is to be understood in any description, where the u.s. is not specially mentioned.

ant.-magl. = ante-marginal.
ang. = angle.
an. ang. = anal angle.
cl. = central.
d. cell = discoidal cell.
d. sp. = discoidal spot.
gr. col. = ground colour.
mar. = margin.
in. marg. = inner margin.
ou. marg. = outer margin.
f. plt. = food plant.
hab. = habitat.
ab. = abundant.
com. = common.
N. = north or northern.
S. = south.
E. = east.
W. = west.
C. = Central.

The times of appearance will be shown by Roman numerals, indicating the month thus : V. = May. These will be followed when necessary by b. = beginning, m. = middle, e. = end, h. = after hybernation.

The abbreviations of authors' names will be those that are usually accepted, and will be added to the end. Names that are but seldom used will be given in full.

The altitudes of mountains will be given in feet, for the reason that most English pocket aneroids are thus graduated.

Figures and descriptions of all the European species will be found in my work "The Butterflies of Europe"—which will be referred to as Lg. B. E.

Mr. W. F. De Vismes Kane's "European Butterflies" will be referred to as Ka. E. B.

Die palaearctischen grossshmetterlinge of Ruhl and Heyne will, when reference to it is necessary, be indicated by R. and H.

The following tabulation indicates the abbreviations used for the different localities in the Amur district. They are taken from Dr. Staudinger's valuable volume of Romanoff's Memoirs, 1892.

Ask. = Askold.
Baran. = Baranowka.
Bik. = Bikin.
Blag. = Blagoweschtschensk.
Bur. = Bureja.
Chab. = Chabarowka.
Nik. = Nikolajewsk.
Pokr. = Pokrofka.
Radd. = Raddefka.
Sid. = Sidemi.
Suif. = Suifun.
Uss. = Ussuri.
Wlad. = Wladiwostok.

The figures given will be from photographs of actual specimens, from my own collection, unless otherwise specified. As a rule European species will not be figured, as they have appeared in "The Butterflies of Europe," and many of them are shown in the works of other authors. In most instances, therefore, these form the first illustrations of the species selected, that have been made in connection with descriptions in English text.

Family I. PAPILIONIDAE.

Larva.—Cylindrical, usually without spines, and with two retractile tentacles on the second segment.

Pupa.—Attached by the caudal end and by a silken girth which supports it in an upright position.

Imago.—Usually of large or medium size. The inner marg. of h.w. distinctly concave, in this respect differing from all other families. Discoidal cells, closed. Anterior legs, fully developed. Antennae, distinctly clubbed.

This family contains seven Palaearctic genera. Three of these are exclusively Asiatic, viz., *Sericinus*, *Luehdorfia* and *Hypermnestra*. Only one genus, *Papilio*, is represented in Britain, and that by the single species, "the swallow-tail" (*P. machaon*),

which is very local in England. *P. podalirius* probably at one time occurred in Britain, and still appears in some popular books as the "scarce swallow-tail." It has not been seen in this country for at least a century, except when accidentally imported from the Continent of Europe.

GENUS I. *PAPILIO* L.

This genus is of very wide distribution, extending over the greater part of the world. The genus as restricted by Latreille, is now being split up into numerous generic groups. I prefer however to keep the seven species here described under the heading of *Papilio*.

All the Palaearctic species are of large size and have the h.w. tailed and at the an. ang. an ocellated spot. The f. w. are triangular in shape, and generally have the ou. marg. slightly concave. Palpi short. Antennae long, with elongate clubs, which are more or less curved upwards.

Four species are found in Europe, two of these, *P. podalirius* and *P. machaon*, are widely distributed. They are common in most countries, appearing from IV. e. to V. according to latitude, and again in VII. and VIII. They are, therefore, generally to be seen throughout the butterfly season. The next most common is *P. alexanor*, which however is far less widely distributed than the two former, occurring only in mountain regions, and is very local. It is abundant in certain spots near Digne, and other places in S. France; in some of these localities being commoner than either *P. podalirius* or *P. machaon*. *P. hospiton* is only to be taken in Corsica and Sardinia, at an elevation of not less than 2,000ft. In Corsica it is not so frequent as in Sardinia.

Papilio machaon, ab. *sphyrus* Hb.

Papilio xuthus L.

The remaining species in our list are Asiatic. *P. xuthus*, which somewhat resembles *P. machaon*, but is larger and paler, with its smaller dimorphic form *xuthulus*, and *P. maackii*, a splendid species of

oriental aspect, with its smaller dimorphic form *raddei*, are only found in the Amur Valley. I have admitted one more species *P. alcinous* from Corea, a handsome black species, marked with red lunules on the h.w., which also occurs in China and Japan.

P. machaon var. *sphyrus* Brem.

A good way of obtaining *Papilio alexanor* and *P. hospiton*, is to collect, at the proper season, the larvae on their food plants. The larva of the former is not difficult to find at Digne about the end of July, on *Seseli montanum* and other umbellifers. Those who visit Vizzavona, which is of comparatively easy access in the centre of Corsica, should search, in June, fennel plants (*Foeniculum vulgare*) and others of the same order, for the larva of *P. hospiton*. I heard of several captures in 1899 in the above locality. Of the Asiatic species I cannot speak with anthing like personal knowledge, but I believe that they are none of them rare in their respective localities.

The European species of *Papilio* are remarkable for their graceful, sailing flight, but they are capable of flying very strongly and rapidly, especially in the mid-day sun. To capture them it is best not to attempt a chase, but take up a position where they will pass. If missed, they generally soar high into the air, out of reach. They are easiest to take in the earlier part of the morning, before the sun is in full power, and again in the afternoon. At these times, though they are not to be seen in their greatest numbers, they fly more slowly.

1. *P.* **podalirius** L., Lg. B. E. 1, pl. i., fig. 1. larva, pl. v.

♂♀ 72. mm.

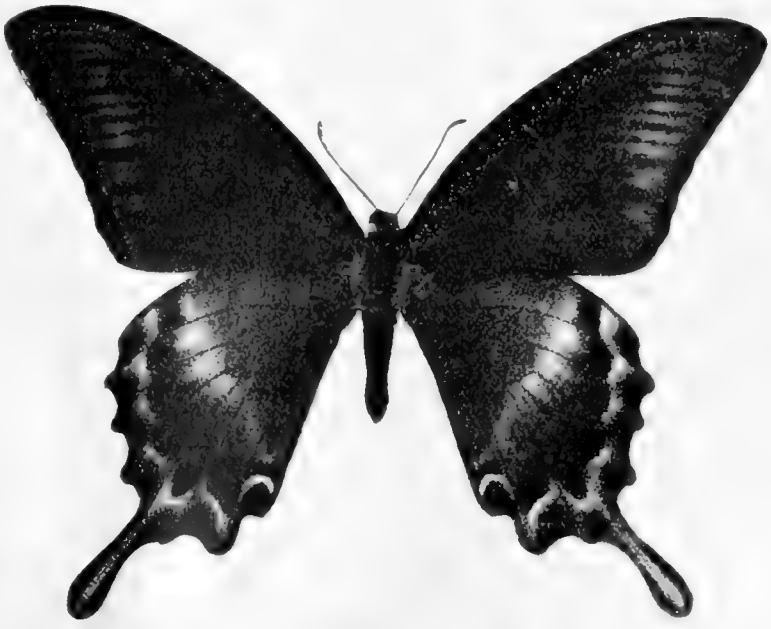
Light primrose yellow. F.w. ou. marg. and base, black. Five black stripes or bands run from the costa towards the in. marg. counting from the ou. marg. ; the 1st, 3rd, and 5th are much longer than the other two. All these except the 5th end in a point, and the flame shape thus produced has procured for the insect its French name of "Le Flambé." The h.w., with long tail, in. and ou. marg. black, ou. marg. with steel blue lunules. Near an. ang. a black spot with a blue centre, about it an orange patch. Area of wing light yellow with central and in. marg. black bands. Head, thorax, abdomen, and antennae black.

Imago, IV.—VI., VIII.

Larva on *Prunus*, *Quercus*, *Amygdalus communis* and *A. persica*, *Berberis vulgaris*, etc., VI. and IX.

Hab., Europe C. and S., N. Africa, W. Asia. Altai., Hill sides up to about 2,000ft., roads, meadows, gardens, etc.

a. var., *feisthamelii* Dup., Lg. B.E. pl. i., fig. 2. Same size as type, but ground colour paler, margins of wings marked with yellow. Dark markings stronger, and h.w. more shaded along ou. marg. A distinct black crescent on the orange patch at an. ang. h.w.



Papilio isaackii Mén.

III., VIII. Hab., Spain, Portugal and N. Africa. Oran and Constantine. III.—VI.

b. ab., *zanclaeus* Zell.—Sometimes larger than type, ♀ with the abdomen white. An ab. of second brood in S. Europe and Caucasus.

c. var., *meigii* Meig.—An intermediate form between the type and *feisthamelii*. HAB., S.E. France.

d. var. *latteri* Aust.—Much resembles *feisthamelii*, but larger and paler, ♀ with white abdomen. HAB., N. Africa. VII., X.

e. ab., *undecemlineatus* Eimer.—This has the 3rd black band on f. w., divided into two on a level with the median nervure, the upper part enclosing a whitish streak. There are also considerable traces of an extra black band between the 3rd and 4th near the costa. The stripes thus appear to run more or less in pairs, recalling the figure 11, hence the name. This seems to be a merely trivial aberration, intermediate forms occurring. HAB., Germany, Mediterranean, littoral, etc.

f. var. *virgatus*, a smaller and lighter form, with white abdomen in ♀. The usual summer form in Syria.

This species is wrongly called *sinon* Poda by Staudinger, Cat. 1871, and this mistake has been repeated by several writers who apparently have omitted to notice the correction at the end of the work, in which the name *podalirius* L. is substituted.

2. *P.* **alexanor** Esp. Lg. B. E., p. 6, pl. 1, fig. 3. Ka. E. B., p. 2, pl. 1., fig. 1.

61—70 mm.

Ground colour much deeper yellow than in *P. podalirius*, sometimes deeper than in *P. machaon*. F. w. with a rather broad black band dusted with yellow, running the whole length of wing, parallel to ou. marg. widest at costa. Wing area with three black stripes, the two outer short, the third broader and extending to in. marg. H. w. with ante-marg. band, dusted with blue and enclosing at an. ang. an orange spot, a central black stripe meeting a black basal stripe at about c. of in. marg., a distinct black oblong disc. spot. Clubs of antennae tipped with yellow. This species varies in size much more than *P. machaon*, it is generally smaller, but the largest specimens quite equal that species in expanse.

VI. e.—VII. e. in S. France and N. Italy, but perhaps earlier in Greece, Asia Minor, and Persia. It frequents rocky mountain gorges.

LARVA on *Seseli dioicum* and *S. montanum*, VII. m.—VIII. e.

a var. *judaeus* Stgr. Has the ante-marginal bands broader than in type. 55—72 mm. HAB., Syria (Jerusalem).

b var. *orientalis* Romanoff. A large pale form with bands narrower than in type. HAB., Asia Minor, C. Asia.

3. *P.* **machaon** L. Lg. B.E., p. 7, pl. 1, fig. 4, larva pl. v., 3. "Swallow-tail."

70—85 mm.

Ground colour of wings bright yellow. F.w. broadly black at base. Three costal black blotches and a broad ante-marginal band extending the whole length of wing, nervures broadly black. Basal patch and marg. bands dusted with yellow. A row of yellow lunules along ou. marg. H.w. with broad black band dusted with blue, not reaching as far as disc. cell. A large dull red ocellas at an. ang. Between the band and the margin a row of well-defined yellow lunules, tails as long as in the last.

IV. e. to IX. e.

HAB., the Palaearctic Region, except the Polar portion and the Canaries. In England, only in the Fens. It is chiefly found in lowland districts, but sometimes as high as 2,000ft. in elevated regions.

HAB., distributed throughout Palaearctic Regions, N. India, China, and Japan.

LARVA on *Daucus carota*, *Anethum foeniculum*, *Angelica sylvestris*, and other umbelliferae. VI. and IX.

In enumerating the varietal forms I have purposely omitted some that do not belong to the Palaearctic Region.

a. ab. *sphyrus* Hb. 54—60mm. Resembles type, but has the fascia on the h.w. so broad as to touch the disc. cell. VII.

HAB., S. Europe, Caucasus, Sicily, Syria.

b. var. *saharae* Obert. 50 mm. A small form inhabiting desert regions in Algeria.

c. var. *asiatica* Mén. 60—62 mm. Like *Sphyrus*, but larger and with a broader band on h.w. HAB., Siberia.

d. var. *aurantiaca* Speyer. Ground colour much deeper yellow than in type.

HAB., S. Europe, Corsica and Sardinia. Occasionally as an ab. in England (?)

e. ab. *niger*, Reutti. A melanic form in which the dark markings are extended and more dusky than in type, and the red spot at an. ang. h.w. is replaced by black. HAB., Germany, etc.

f. ab. *nigrofasciata* Rothke. Darker than type, and with broader stripes and bands. HAB., Germany.

g. var. *centralis* Stgr. Dark markings less intense, ground colour yellower. HAB., C. Asia, Turkestan. Larva on *Capparis spinosa*. V.

h. ab. *watzkai* Garbowski. A more slender and lighter form inhabiting Galicia.

i. ab. *drusus* Fuchs. A brightly coloured and pilose form. HAB., E. Germany (Nassau).

j. var. *hippocrates* Feld. 110 mm. The largest form of the species, the second brood of *Asiatica*. HAB., Amur, Corea.

k. var. *kamtschatadalus* Alph. Size of type, tails of h. w. shorter. Ground colour darker. Marginal bands narrower. HAB., Kamtschatka.

4. *P.* **hospiton** Géné. Lg. B. E., p. 8, pl. II., fig. 1, larva, pl. v., 4.

70—76 mm.

In size and coloration this species greatly resembles *P. machaon*, but on all the wings the dark markings are more intense. H.w. with exceptionally short or even rudimentary tails. The ante-marginal fascia very broad reaching to the discoidal spot, and shaded off into the ground colour, the blue scales upon it very vivid and more circumscribed in arrangement, the sp. at an. ang. very small.

V. and VI.

Hab., Sardinia and Corsica only, frequenting rocky gorges in the mountains at from 2,000ft. to 4,000ft. In Corsica for instance from Vivario to the Col de Vizzavona, on the lower slopes of Monte d'Oro and other like places. Said to be commoner in Sardinia, though the species is absolutely confined to these islands. It is not an insular form of *P. machaon* which also occurs there, but is perfectly distinct.

Larva brighter green than that of *P. machaon* and covered with short prickles on *Ferula communis* VI. and VII. b.

5. *P.* **xuthus** L.

80-102 mm.

Has somewhat the aspect of *P. machaon*, but considerably larger, the ground colour much lighter, and the dark markings blacker and differently disposed, especially at base of f. w. A very small black spot at an. ang. h. w.

VII., VIII.

Hab., Amur-Corea, also China and Japan.

Larva on *Phellodendron amurense*. IX.

a. var. *xuthulus* Brem. Resembles type, but much smaller marginal bands proportionally narrower, h. w. with an orange spot at an. ang. V., VI. Hab., Amur. Spring brood of *Xuthus* from hiber. pupa.

6. *P.* **maackii** Mén.

90—115 mm.

Wings black, f. w. with metallic greenish blue scales at base, and an ill-defined band of the same colour towards ou. marg. H. w. indented on ou. marg., and with well-developed tail, shiny metallic blue-green central band undefined at edges, and marginal lunules of the same colour. A dull red or purple spot at an. ang.

VII., VIII.

Hab., Amur, Ask., Chab., Pokr., Wlad.

Larva on *Phellodendron amurense*. IX.

a var. *raddei* Brem. 80—86 mm. Smaller than type and generally lighter, h. w. more suffused with greenish blue. The 5 marginal lunules and an. spt. light red. V., VI. Spring brood of *Maackii*. Hab. Amur (Bureja, Uss., Ask.), Corea.

7. *P.* **alcinous** Klg.

80—85 mm.

F. w. dark grey with broad black markings along course of nervures. H. w. black, strongly indented on ou. marg. and with wide and rounded tails. A row of five marginal scarlet lunules.

Hab., Corea, also found in Amur and Japan

(To be continued.)

Edward Frankland, K.C.B., F.R.S.—Following soon upon the death of Sir William H. Flower, comes the loss of another who, for the sake of science, was honoured with knighthood. Sir Edward Frankland was an eminent chemist, his speciality having been water examination and its increased purity for human consumption. He was born at Churchtown, near Lancaster, in 1825, and studied under Bunsen, who also died within a few days of Frankland. Dr. Frankland received honorary degrees from the Universities of Oxford and Edinburgh, and from several European Universities. He died while on a pleasure trip in Norway, on the 9th of August, 1899.

A HISTORY OF CHALK

By Edward A. Martin, F.G.S.

(Continued from page 78.

THE name "Chalk" was first used in a geological sense by Martin Lister in 1684, and may be described as a white limestone, so great is the proportion of carbonate of lime it contains. Chemically considered, there is a great difference between Atlantic Ooze and White Chalk, as the former, according to David Forbes, contains 26.77 per cent. of insoluble gritty sand and rocky débris, while in chalk there is seldom more than two per cent. of equivalent matter. This marked difference is counterbalanced by the great calcareous purity of the Chalk, which was found to contain no less than 98.4 per cent. of carbonate of lime, with a trace of carbonate of magnesia and of alumina. This is shown in the following tabulation by Forbes.

	Atlantic Ooze.	White Chalk Shoreham, Sussex.	Grey Chalk Folkestone
Carbonate of lime...	50.12	98.4	94.09
do. magnesia...	—	8.0	0.31
Alumina (sol. in acid)	1.33	.42	—
Sesquioxide of iron	2.17	—	
Silica (insoluble) ...	5.04	—	—
Fine gritty sand, &c.	26.77	1.10	3.61
Water	2.9	—	.7
Organic matter ...	4.19	—	—
Chloride of sodium and Soluble salts	7.48	—	1.29
	100	100	100

Analyses of the finer portions of *Globigerina* ooze, after the coarser parts had been washed away, showed a great resemblance in chemical composition to analyses of the ocean Red Clays. The coarser portions consist almost entirely of *Globigerina* tests, of the same ooze. Hence the conclusion is that the Red Clay is, in reality, in coarse of deposition, wherever there is a water surface to receive meteoric dust: but in the Oozes its deposit is masked by the ingredients of the calcareous organisms.

In passing upward through the Chalk from the basement-bed of the impure Chalk Marl, it is to be expected that analyses of Chalk taken from the various beds would differ to some extent as to the percentage of carbonate of lime, which each specimen contained. In two analyses made by Professor J. T. Way of specimens of Chalk Marl, 73.19 and 86.11 per cent. of carbonate of lime were found respectively. A piece from the Chalk with Flints, contained 98.22 per cent. of carbonate of lime, whilst a portion from the Upper Chalk yielded 97.75 per cent. A specimen from the base of the Grey Chalk at Folkestone, gave only 94.09 per cent. of carbonate of lime. In three samples of the more highly calcareous oozes, two of which were from the South Atlantic, and one from the Pacific Ocean, the proportions of calcium carbonate were found to be 91.17, 89.5 and 79.79 per cent. respectively. In referring to these analyses, the

analysts call attention to the fact that the dredgings are more or less from the surface of the ooze, where it must be full of newly-acquired carcases of dead Foraminifera. Had it been possible to obtain specimens for analysis from beneath the surface of the ooze, where it had been longer exposed to chemical action, the organisms would have been in a more divided condition, and there would have been a larger proportion of amorphous matrix. These oozes in the present deep seas, at depths of between 1,800 and 2,000 fathoms, may be held to possess a great chemical and microscopic resemblance to chalk.

We have now touched upon the results of this famous deep-sea expedition, in so far as it is germain to our subject. As may be imagined from the task which was placed before it at the outset, a mass of knowledge was collected, much of which is of intense interest to the geologist, as showing the method of deposition of strata, and especially of the gradual building-up of organically-formed rocks.

It will also be observed that the characters of the Chalk which have been previously represented, agree more particularly with those layers of globigerina ooze which are found, more or less consolidated, beneath the upper creamy surface, layer at the bed of the Atlantic and other ocean areas. Generally speaking Chalk has a specific gravity of from 2.4 to 2.6. There is usually a small proportion of water contained in it when fresh from the quarry, amounting to about 5 per cent., whilst there are generally, even in its purest forms, traces of free silica and ferric oxide. The silica is often present in greater proportions, whilst in the red varieties of Chalk there is frequently as much as 9.28 per cent. of silica and 9.6 per cent. of oxide of iron, together with a little magnesia. Alumina may be present in very varying proportions.

It is a remarkable fact that the true Chalk is the only formation of its kind throughout the whole succession of geological strata. In this way we see now-a-days in the deep ocean depths a certain kind of formation accumulating, known as calcareous ooze, leaving out of consideration for the moment the siliceous ooze. This ooze bears the character of modern Chalk. There is no reason why in former times, over and over again, a similar calcareous formation—a Chalk, should not have been accumulating in the oceans of those days. Our hard white Chalk stands out peculiarly alone, as the sole formation of its kind known to geologists. Yet we know of no reason why there should not be a representative Chalk in each of the fifteen great periods known in the geological ages. The greater portion of the stratified systems are marine in character: there are a few fresh water, and rather more of estuarine deposits. The marine strata, however, exhibit no intercalated beds to show that they were formed so far out at sea as to give rise to a calcareous ooze. It is only when we come to cretaceous times we find any trace of such a ooze. Mr. Jukes-Browne says it is now generally acknowledged that the great mass of the rocks which form our modern continents are such as are now formed only within 200 and 300 miles of land, and they very seldom include any deposits resembling those now accumulating in the depth of the Atlantic and Pacific Oceans. There is only one formation in Britain, undoubtedly accumulated in deep water, at a great distance from land of a continental character, and that is the Chalk (1). Therefore, with this one exception, all the formations it is possible for the geologist to examine, are such as have been formed in a comparatively narrow area of 200 to 300 miles in width around the lands of the various periods. Beyond this area, we are unable to judge what forms of life existed.

Deep sea life is absolutely hidden from us until Cretaceous times, and then we get a temporary glimpse of life at a depth of 400 to 500 fathoms, or 2,400 to 3,000 feet. If, as Professor Hull maintains, the birth of the Atlantic Ocean took place at the end of the Carboniferous era, it would seem almost possible that the Atlantic ooze has been in process of formation ever since that epoch. Its eastern extension, including those in the whole of Europe, has undergone a series of oscillations which have caused the deposition of post-carboniferous stratified Europe. Whilst in that period which we call Cretaceous, the continent sank deepest of all, until it constituted to all intents and purposes a portion of the bed of the long-ago Atlantic Ocean.

It is now generally accepted that in the modern sea-oozes we have the analogues of the Chalk deposits, and it is fairly agreed that their rate of growth represents the probable rate at which the Chalk itself grows. It has been reckoned as an outside estimate, that certainly not more than a foot of ooze accumulates in a hundred years. If the ancient fossil ooze we call Chalk, which, reckoning all its various stages, we may estimate at a 1,000 feet thick, accumulated no more quickly, we have a period of 10,000 years at least, during which the Chalk Sea was in existence. Too much stress must not, however, be laid upon the period mentioned as being in any way exact. There would be local causes that might affect the rate of deposition. The various platforms in the Chalk indicate changes of conditions which would affect it. Further, certain stages in the Chalk that appear in some parts, are unrepresented in others, whilst much of the chalky ooze at one time laid down, has since suffered greatly by denudation. The Chalk as we know it cannot be the whole of what formerly existed. A hundred and more years ago we find Gilbert White writing: "was there ever a time when these immense masses of calcareous matter were thrown into fermentation by some adventitious moisture; and were raised and leavened into such shapes by some plastic power? Perhaps I may be singular in my opinion, and not so happy as to convey to you the same idea; but I never contemplate these mountains without thinking I perceive somewhat analogous to growth in their gentle swellings and smooth fungus-like protuberances, their fluted sides, and regular hollows and slopes, that carry at once the air of vegetative dilation and expansion." White was an early geologist, but a much more recent

(1) *The Building of the British Isles.* A. J. Jukes-Browne.

one, the late Professor Prestwich, could not, in the spirit of uniformitarianism, accept in the full, the belief that the Chalk was deposited in the same way and by similar agencies as those which we now see in progress in the Pacific and Atlantic Oceans. He thought that the conditions then prevailing were special, or at least peculiar to the age, and that in addition to the accumulations of organic matter, there was, "a considerable chemical precipitate of carbonate of lime taking place in the Chalk sea." On the other hand, it is to be noted that according to Bischof, no precipitation of lime from sea water is possible until after 17.18 of the water has evaporated. It is now generally acknowledged that there is no reason to seek for any special conditions of deposition. New discoveries are constantly being made, as the Chalk is being more and more examined, which show the great similarities, in the methods of their deposition, of the Chalk and of ocean ooze.

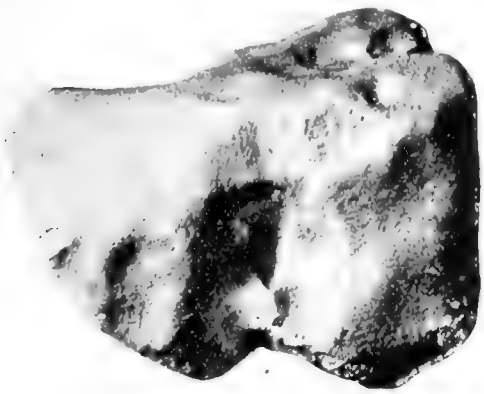
(To be continued.)

METEORITES.

By John T. Carrington.

(*Continued from page* 69.)

IN my article last month, special attention was paid to the occurrence of iron and nickel in meteorites and siderolites. Among the more important constituents hitherto identified, there have been found, in varying quantities the following :—iron, magnesium, antimony, silicon, oxygen, nickel, cobalt, chromium, manganese, titanium, tin, copper, aluminium,



Meteorite, fell West Liberty, Iowa, 1875.

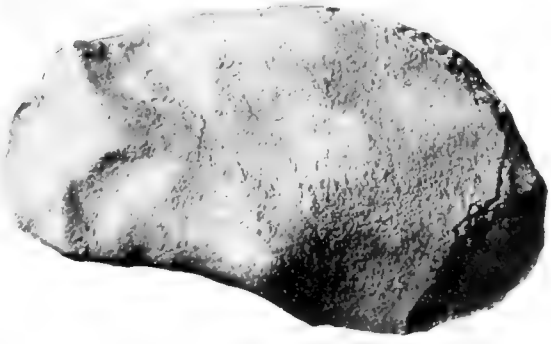
potassium, sodium, calcium, lithium, arsenic, phosphorus, nitrogen, sulphur, chlorine, carbon, hydrogen.

Among the minerals there have been identified enstatite, triclinic, felspar, chromite, peridote, magnetic pyrites, pyroxene, iron oxide, graphite, schreibersite, oldhamite, laurencite, and daubréelite, with, perhaps, traces of one or two others, though these do not appear to have been very definite.

The gases obtained by analysis include hydrogen and oxygen, as already stated. Carbonic acid gas, and carbonic oxide in association with hydrogen, is found in the stony meteorites. The latter gas is perhaps the most abundant. Traces of nitrogen have been detected.

The evanescent character of the train following the path through the sky, of a meteor, renders observation and accurate definition of its character and origin extremely difficult. Attempts have been made, though with but limited success, to investigate the phenomenon by the aid of the spectroscope. It may, however, be said that the results are so small, that with the exception of the usual lines representing oxygen and hydrogen, little else has been identified. The colour of the trail of light varies considerably, and is probably due to the gases released during combustion, influenced by the sodium, manganese or other metal or mineral near the surface of the meteorite, whilst being consumed.

Returning to the Gregory Collection of Meteorites, it contains examples of upwards of four hundred distinct falls, and somewhat more than five hundred and fifty specimens. These may be divided into 225 stone meteorites or aerolites, 155 examples of meteoric iron, and 24 siderolites, some of the various sections being in duplicate. The collection is especially rich, considering that it has been entirely the work of an individual and without Government aid, in examples of the ancient falls; which are now



Meteorite, fell 1803, L'Aigle, France.

unattainable, unless some public or private collection is dispersed.

The Ensisheim stony meteorite mentioned last month as having fallen in 1492 is represented in the

Gregory Collection by a fine piece. Among other stony ones are examples of falls from Barbotan (1790); Salles (1789); L'Aigle (1803), two fine complete stones; a characteristic piece from Chantonnay (1812); a fine specimen from Chassigny (1815), which is a rare type; another great rarity of which only one stone is known, is from Aubres (1836); another difficult one to obtain is from Chandakapur (1838); there is a fine example from Chateau Renard (1841); the rare American meteorite from Cabarras county (1849); a fine specimen from Dhurmsala (1860); a rare type from Grosnaja (1861); a small complete stone of the rare type from Orguiel (1864); a fine complete stone of the Saint Mesmin fall (1866); a choice fragment of the Daniels Kuil fall (1868); a piece obtained from the late Abbe Moigno of the Cleguéréc (1869); a fine complete stone from West Liberty (1875); a very fine specimen from Soko Banja (1877); a characteristic specimen of the Pavlovka fall (1882); a large example of the fall at Alfianello (1883); a very rare specimen of extremely scarce type is from Novo-Urei (Alatyr) (1886); a rare Indian stone from Lalitpur (1887); an exceptionally fine specimen from Tabory (1887); a very rare complete stone from Bielo-Krynitschie (1887); about half the whole stone that fell at Pipe Creek in 1888.

Among the siderolites and siderites is a portion of the earliest known of the former, from Krasnojarsk (1749); a fine slice of the Sierra de Chaco (1864); a piece of the very rare fall from Pavlodar (1885); a complete mass found in 1890 at Nejed; another found in 1891, of the Youndegin fall, portions of which were figured in SCIENCE-GOSSIP last month; a very fine mass from Thunda, which fell in 1886; a mass from Waldrons Ridge; a complete mass found in 1891 at Canon Diablo, and many others of great interest.

Most of the above-named examples of meteorites are good-sized specimens for handling, but many, very rare specimens, are only of small size. In a number of cases the whole stones were quite small, from which only little pieces were detached. Some of the rarest in the collection and most difficult to procure are those from Yorkshire (1795), Tabor (1753), Luponnas (1753), Albareto (1766), Mauerkirchen (1768), Siena (1794), Krakhut (1798), all of them having fallen previously to 1800. Since that date, there are many good examples in the collection such as Stannern (1808), which has a black shining glazed crust, rather a rare type; Mooresfort, Tipperary (1810), and another from Limerick (1813), both rare Irish specimens, the former from the Croker Collection. There are also specimens of more modern falls, some from an enormous shower that fell at Pultusk, in Poland, in 1868, there being many thousands, from the size of a pea upwards. In 1872 a curious stone, a few pounds in weight, fell at Orvinio, near Rome, this had a very unusual brecciated structure which is of some rarity. The falls of Soka-Banja, Servia (1877), Mocs, Hungary (1882), Alfianello, Italy (1883)—a big stone of 400 lbs., Kesen, Japan (1850), Winnebago Co., Iowa (1890), a large shower; at Bath, Dakota (1892), Beaver Creek, Brit. Columbia (1893), Fisher, Minnesota (1894), Ambapur-Nugla, India (1895), Lesves, Belgium (1896), Zavid, Bosnia (1897) are also represented.

Of Meteoric Irons some rare ones are those of Elbogen, Bohemia, described in 1811, Lenarto, Hungary (1814), Lockport (1818), Scriba (1834), Burlington (1819), all in New York State; Jewell Hill, North Carolina (1854), Chesterville, South Carolina (1849), Ruffs Mountain (1850), Chulafianee, Alabama (1873), Lagrange, Kentucky (1860), are some of the earlier irons which are now difficult to procure. There are others later of which that from South Catarina, Brazil contains nearly 30 per cent. of nickel. is a very remarkable one, being one of the richest in that metal.

Several Meteoric Irons have been found of late years in S. Africa, probably partly owing to facilities of travelling and of exploration. From the same region also, several accounts have come of falls, that have created some sensation in newspapers; but one seldom hears anything further about them.

Many interesting siderolites are represented especially those wonderful little complete masses, of which several pounds were obtained, ranging in size from $\frac{1}{4}$ oz. to 2 or 3 ozs. each, by raking them in from the edge of a lake at Estherville, Iowa, where they fell on May 10, 1879. Each piece being complete in itself two or three large masses fell at the same time the largest over 400 lbs. Another rare example is that in the possession of the Shah of Persia, which fell at Karand, near Teheran in Persia in 1880. It is a mass of about 100 lbs. in weight, and being the private property of the Shah, it is now very difficult to procure specimens from it, as it is very highly valued by its possessor. The Kiowa, Kansas siderolite, found in 1890, is also shown by a fine example It is a siderolite of the "Hallasite" type.

The illustrations are taken from specimens in Mr. Gregory's collection and are both from complete stony meteorilites. No. 1 fell in February 1875 at West Liberty (Homestead) Iowa County, Iowa, U.S.A. Its weight being seven pounds five ounces. This specimen is particularly interesting because it is covered all over with a thin black crust formed during incandescence through the friction with the air its descent. Fig. 2 is one of the fall on April 26, 1803, at L'Aigle, Orme, France. Its weight is 26 ounces. It is also covered with the black crust excepting the portion at the right end where the crust has been chipped probably through striking a stone on reaching the earth.

One could imagine the destruction which would occur through a meteorilite of considerable size striking any object on its reaching the earth. If one were to insure against such destruction or death, caused by the fall of a meteorite, it is probable that Lloyd's or other Assurance Companies would accept the insurance at the lowest known premiums. Still there is at least one known case of a man being killed by a meteorite, a priest in fact, and of more than one house being destroyed.

GEOLOGY

CONDUCTED BY EDWARD A. MARTIN, F.G.S.

EDITORIAL NOTE.—Many of our geological readers have now returned from their holidays, and are no doubt prepared with geological notes, made while away. May I remind them that we are always glad to hear from them, and to find space for anything which may be of interest. We are anxious that our geological columns shall contain the best of materials for geological study, and at the same time the needs of the elementary geologist should not be overlooked. SCIENCE-GOSSIP is intended to appeal to every class of readers, and we shall be particularly pleased if the beginner will make use of these columns when he requires elucidation of a subject that may have been but briefly touched upon herein.

FOSSIL RESIN IN THE CHALK. Mr. C. C. Fryer has obtained from Mr. Griffiths, of Folkestone, a mass of resin, which the latter found in the grey chalk, about forty feet above the Upper Greensand. The resin is of a dark amber colour and burns freely, giving off a quantity of smoke. In its present state it weighs a trifle under three ounces, and measures three and a half inches long, but there are appearances on one side of exposure on the face of the cliff, so that possibly more may have been lost by sub-aerial denudation. The finder had on previous occasions discovered in the same locality pieces of wood. In cretaceous beds other than chalk, an extensive flora has been discovered, as recorded in SCIENCE-GOSSIP, N.S., Vol. iv., p. 158.

CRETACEOUS BEDS OF FOLKESTONE. Folkestone is a convenient place for studying geology. On the west there is the Lower Greensand, such as the Hythe, Sandgate, and Folkestone Beds, called after the places where they were first examined. The last-named forms the East Cliff. At Copt Point the Gault rises from beneath the higher beds with phosphatic nodules at its base. Gradually lower beds are exposed, till the Upper Greensand crops up, then the Grey Chalk and Chalk Marl. Fossils found in the Hythe Beds are *Pecten cincta*, *Lima cottaldina*, *Cyprina angulata*, *Cardita fenestriata*, *Cucullaea exaltata*, *Trigonia*, *Panopaea plicata*, *Thetis sowerbyii*, *Gervillia anceps*, and *Terebratula sella*. The Sandgate Beds contain but few fossils, but in the Folkestone Beds there are large *Exogyra sinuata*. The Chalk Marl is much faulted; in some place it touches the shore, and in others it is ten or twelve feet above it. Fossils found in the Gault are *Inoceramus concentricus*, *I. sulcatus*, *Nucula pectinata*, *Aporrhais marginata*, *Dentalium decussatum*, *Belemnites minimus*, *B. attenuatus*, *Ammonite splendens*, *A. tuberculatus*, *A. varicosus*, *Hemiaster astrias*, *Palaeocorystes stokesii*, and others. —*G. Fletcher Brown*, 3, *Topsfield Parade*, *Crouch End*, *London*.

RATE OF ICE-FLOW.—From observations made by Mr. E. J. Garwood in Spitzbergen, in 1897, the ice-sheet seemed to indicate a rate of movement of not less than 15 to 20 feet in 24 hours, whilst the glaciers near the sea-margin appeared to be travelling about 25 feet in the same time.

SCIENCE GOSSIP

THE death is announced of Charles Howie, of St. Andrews, a botanist of some renown, who published a flora of the mosses of Fife and Kinross.

MRS. AYRTON occupied the chair at the Science Section of the recent Women's International College. Astronomy was represented by Mdlle. Klumpke from the observatory at Paris; Geology by Miss Raisin of Bedford College; Chemistry by Miss Dorothy Marshall of Girton; Bacteriology by Mrs. Percy Frankland, and Biology by Miss Ethel Sargant.

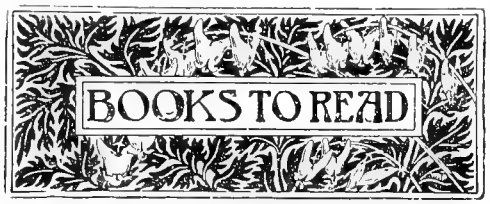
THE sum of £45,000, the amount allotted by the Government towards the expenses of the proposed National Antarctic Expedition is rather disappointing. This is especially so as it leaves the amount of £100,000, the estimated cost of the undertaking, short by some £15,000. It is hoped that the Australasian Colonies may come forward with part of the desired financial aid still necessary.

THE "Matriculation Directory," recently published by Mr. W. B. Clive for the University College Press, contains exhaustive information concerning the Science and Art examinations of the London University. Though its title is simply matriculation, it gives the intending student all details he can require with regard to preparation for the Intermediate Scientific and the Bachelor of Science examinations, the best text books, and the points to which special preparation should be given.

WRITING in the "Entomologist" for June, Mr. J. Henry Fowler of Ringwood, draws attention to the number of moths floating on the surface of tan pits. The fluid contained in these pits is largely an essence of oak bark. He suggests "good liquor from the tanyards might be tried by collectors as a substitute for treacle in attracting moths." We imagine most collectors would prefer to put another "good liquor" into their treacle—or elsewhere. Still it may be worth a trial.

THE Manchester Museum has acquired the Dresser Collection of Birds. The author of the "Birds of Europe" has spared neither trouble nor expense to make this collection as complete as possible, his special aim having been to render it of utility to workers. It contains the allied species from the Palaearctic region generally, and also the materials used by Mr. Dresser in preparing his monograph on bee-eaters and rollers.

SALINITY OF SEAWATER.—A friend who lives here and bathes every morning in summer, tells me that the sea is apparently much more salt than usual on some few days. This only occurs once or twice during the summer. He noticed that it was so a day or two ago. Is it a fact that the sea in the English Channel is more salt sometimes than at others? If so, what is the cause? Also, is the sea more salt on the coast of Wales than in the Channel? for the same friend found it apparently so on the coast of North Wales last summer. I am sorry I cannot give you more detail as to wind, tide, etc., but these particulars have not been noted.—*Frank Sich, junr., The Tearage, Shoreham, Sussex.*



NOTICES BY JOHN T. CARRINGTON.

Birds of the Humber District. By JOHN CORDEAUX, J.P., F.R.G.S., M.B.O.U. viii. + 40 pp., 9in. × 5¾in. (London : R. H. Parter, 1899.) 2s. 6d. net.

The exact title of this work is, "A list of British Birds belonging to the Humber District, having special reference to their migrations." It is revised up to April, 1899, and prefaced by an introduction. The number of species reaches 322, a very large record for so limited an area. Of course, they include residents, summer visitors, winter visitors, and periodical visitors, also rare and accidental occurrences. This is no mere list of names, for attached to each species are one or two paragraphs of notes, defining the position of the bird as an inhabitant, as regards numbers increasing or decreasing when resident, dates of arrivals and departures if migrants. There is also much other valuable information, which has the advantage of Mr. Cordeaux's high reputation for accuracy and experience as one of our leading ornithologists.

The Birds of Breconshire. By E. CAMBRIDGE PHILLIPS, F.L.S. xi. + 158 pp., 8in. × 5½in., with two illustrations. (Brecon : Edwin Davis, 1899.) 7s. 9d.

Although the title page does not indicate the fact, this does not appear to be the first edition, as the author republishes the preface to a former issue, which appears to have been privately circulated about seventeen years ago. The previous edition has been rewritten and considerably enlarged, and where possible the Welsh names of birds have been added, these having been largely taken from a rare old Welsh dictionary by Edward Williams, the Blue Bard of Glamorganshire, and printed in Brecon in 1826. Williams seems to have had some knowledge of birds, but his local names unfortunately appear to have been rather generally applied, and without much attempt at identity of species. We are glad to find among the increasing numbers of native birds in South Wales may be included the peregrine falcon, black grouse, stock dove, nut hatch, and greater and lesser spotted woodpeckers. The illustrations are of black grouse and pheasant hybrids from near Builth, and of a kite's nest, found in 1875 near Upper Chapel. The book closes with a list of scientific names of the county birds.

Lancashire Sea Fisheries. By CHARLES L. JACKSON, viii. + 85 pp., 7½in. by 5in. (Manchester : Abel Hayward and Son, 1899), 2s.

On the 24th of May last, Mr. Jackson delivered a lecture at the Chadwick Museum, Bolton, upon the Lancashire sea-fisheries. This he has now reprinted with some additions and an introduction. The book contains a good many notes of some natural history value, for instance, he describes the growth of conger eels in the Southport Aquarium, where they increased during about five years captivity from three pounds weight to upwards of one hundred pounds weight. The book is chattily written as becomes a popular lecture.

Museums Association. Report of Meeting held at Sheffield, 1898. Edited by HERBERT BOLTON, F.R.S.E., xx. + 193 pp., 8½in. by 5½in., with six illustrations (London : Dulan and Co., 1899.)

This volume is a report of the proceedings of the Museums Association with the papers read at the Ninth Annual General Meeting, held in Sheffield, July 4th to 8th, 1898. It contains also the balance sheet of the Association for the year previous and the President's address. Among the papers read was one by Professor A. Denny, F.L.S., University College, Sheffield, on the "Relation of Museums to Elementary Teaching"; "The Peoples' Palace" by James Paton, F.L.S., Superintendent of Museums, Glasgow; "The Arrangement of Herberia" by E. W. Holmes, F.L.S., Curator of Museums of the Pharmaceutical Society of Great Britain; "Provincial Museums" by H. Bolton, F.R.S.E.; "Marine Animals Mounted as Transparencies" by H. C. Sorby, L.S.D., F.R.S., also several others dealing with science and art subjects.

The Story of the Eclipses. By GEORGE F. CHAMBERS, F.R.A.S. 259 pp., 6in. × 4in., illustrated. (London : George Newnes, Ltd., 1899.) 1s.

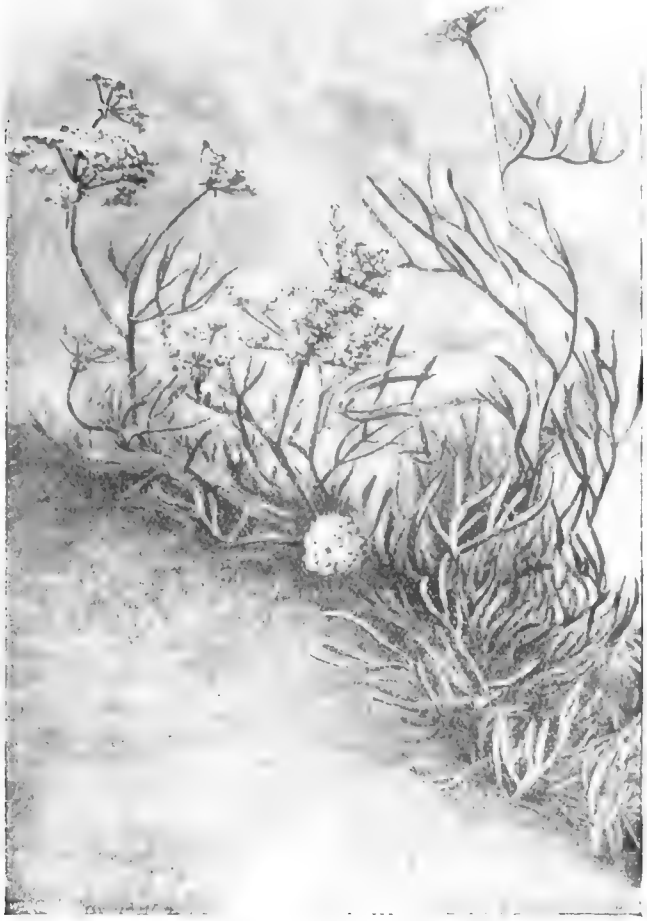
In writing this little work the author has had in view that his readers will find it useful to know something of eclipses generally, with special reference to the total eclipse of the sun on the 28th of May next. He deals with his subject in a pleasantly popular manner, and his scientific side of the work is liberally interspersed with anecdote and history. The illustrations are helpful.

The Marine Diatoms of France and England. Part i. By MM. H. and M. PERAGALLO. 2 volumes. Vol. I. Text iii+236 pp., 11in. × 7½in. Vol. II. Plates. 50 plates, with 1,124 species and variations. (Paris : J. Tempère, 168, Rue St. Antoine.) £2, post free.

The first part of this elaborate and costly work is now published, and should prove of the utmost value to those microscopists, and they are many, whose special study is diatoms. We cannot do better than quote *in extenso* the opening paragraph of M. H. Peragallo's preface. "It is with confidence that my brother and I present to the restricted but select world of amateur diatomists, our Flora of French Diatoms. We hope that all who, like ourselves, devote some of the leisure moments left them by the often absorbing claims of their profession, to the study, or even to the examination simply of these algae, all curious, and all interesting, will encourage us in our enterprise, and that our work will be one of those of which the amateur of diatoms will love to turn the leaves for his pleasure, and to utilise for his work." The book is meant as a supplement to that of the famous diatomist Dr. Henri Van Heurck, of Antwerp, and the editors claim for it, that when completed, it will contain all the species identified in France and England. The classification adopted is known in this country as that of H. L. Smith, and this, the first part, deals with the Raphideae, leaving the Pseudo-Raphideae, and the Anaraphideae to be completed in subsequent parts. The present section is in two volumes, the first being devoted entirely to description, and the second containing the plates. These last are 50 in number, and illustrate no less than 1,124 species and varieties. The drawings are, as far as possible, made on a uniform scale of ×900, and reduced to ×600. The advantage of this is obvious. The price of the present part is £2, post free, and of the complete work £4, but the price will be raised to £5 at the end of the present year. The work is of course in French. F. S. S.

The Romance of Wild Flowers. By EDWARD STEP, F.L.S. 357 pp., 7½in. × 5in., with 200 illustrations. (London and New York: Frederick Warne and Co., 1899.) 6s.

The sub-title of this book, "A Companion to the British Flora," indicates the intention of the author, and as he says in his preface, it is not intended for botanists, but for the unscientific lover of flowers. It is a series of chatty chapters, twenty-nine in number, that will appeal to many persons who delight in wandering through leafy lanes, umbrageous woodlands or over breezy downs. It is a collection of odds and ends of the pleasanter kind connected with the lighter side of botany. It is, however, not all plant lore, as there are frequent touches of science, especially with regard to the seeding operations. This science is popularly told and cannot fail to be understood even by those who have not had any special training. One of the pleasantest features of this book is its illustrations, all of which are original. Mr. Step has gone forth with his camera and done for flowers what the Kearton's have done for birds. The result is a long series of plates, more or less successful. Some are distinctly so, and by permission we reproduce one of samphire. In addition to these plates are large numbers of drawings in the text, which, though somewhat diagrammatic will be most useful to the uninitiated reader. The work as a whole can be recommended, and will doubtless give pleasure to many readers, and cannot fail to create a taste for the investigation of our wild plants and their structure.



SAMPHIRE.

From "*The Romance of Wild Flowers.*"

CONDUCTED BY F. C. DENNETT.

1900 Sep.	Rises. h.m.	Sets. h.m.	R.A. h.m.	Dec. Position at Noon. ° ′
Sun ... 4	.. 5.19 a.m.	.. 6 39 p.m.	.. 10.53	.. 7.11 N.
14	.. 5.34	.. 6.17	.. 11.29	.. 3.24
24	.. 5.50	.. 5.54	.. 12.4	.. 0.29 S.

	Rises	Souths	Sets	Age at Noon.
Sep.	h.m	h.m.	h.m.	d h. m.
Moon 4	.. 4.40 a.m.	.. 11.25 a.m.	.. 5.56 p.m.	29 0 12
14	.. 3.25 p.m.	.. 7.36 p.m.	.. 11.54	9 8 27
24	.. 8.15	.. 3.47 a.m.	.. 0.12	19 8 27

Sep.	Souths h.m.	Semi-Diameter	R.A. h.m.	Dec. Position at Noon. ° ′
Mercury .. 4	.. 10.50 a.m.	.. 3.7′	.. 9.44	.. 13.31 N.
14	.. 11.6	.. 2.9″	.. 10.39	.. 10.17
24	.. 11.35	.. 2.5″	.. 11.47	.. 3.19
Venus .. 4	.. 11.49 a.m.	.. 4.9″	.. 10.43	.. 9.40 N.
14	.. 11.56	.. 4.9″	.. 11.29	.. 4.54
24	.. 0.2 p.m.	.. 4.9″	.. 2.15	.. 0.8 S.
Mars ..14	.. 2.1	.. 2.1″	.. 13.35	.. 9.49 S.
Jupiter ..14	.. 2.52	.. 15.1″	.. 14.25	.. 13.25 S.
Saturn ..14	.. 5.32	.. 7.6″	.. 17.6	.. 21.39 S.
Uranus ..14	.. 4.36	.. 1.8″	.. 16 10	.. 20.58 S
Neptune ..14	.. 6.15 a.m.	.. 1.2″	.. 5.47	.. 22.9 N.

MOON'S PHASES.

		h.m.			h.m.
New ..	Sep. 5 ..	3.33 a.m.	*1st Qr.* ..	Sep. 12 ..	9.49 p.m.
Full ..	,, 19 ..	0.31 p.m.	*3rd Qr.* ..	,, 26 ..	3.3 p.m.

In apogee September 3rd, at 1 a.m., distant 252,600 miles; in perigee on 18th, at 7 a.m., distant 223,400 miles; and in apogee again on 30th, at noon, distant 252,000 miles.

CONJUNCTIONS OF PLANETS WITH THE MOON.

				° ′
Sep. 3 ..	Mercury* ..	3 p.m. ..	planet	4.8 N.
,, 5 ..	Venus† ..	2 a.m. ..	,,	6.44 N.
,, 8 ..	Mars* ..	1 p.m. ..	,,	4.54 N.
,, 9 ..	Jupiter ..	7 p.m. ..	,,	4.51 N.
,, 12 ..	Saturn* ..	6 p.m. ..	,,	1.55 N.

* Daylight. † Below English horizon.

OCCULTATIONS.

Sep.	Star.	Magnitude.	Disappears h.m.	Angle from Vertex. °	Reappears h.m.	Angle from Vertex. °
13 ..	I Sagittarii ..	5 ..	5.5 p.m. ..	66 ..	6.9 p.m. ..	303
24 ..	A^1 Taurii ..	5 ..	3.29 a.m. ..	131 ..	4.25 a.m. ..	205

THE SUN has of late been in a state of great quietude, but should be watched. On September 23rd at 6 a.m., the sun's centre crosses the equator.

MERCURY is a morning star all the month, reaching its greatest elongation, 18° 2′ west at 7 a.m. on 5th September. It is well placed for observation during the first half of the month. On the 3rd it will be only a few degrees distant from the crescent moon. On the 8th it will be less than a degree from the first magnitude star Regulus, or *a* Leonis.

VENUS is too close to the sun for observation, being in superior conjunction with that orb at 8 a.m. on 16th of September.

MARS, JUPITER and URANUS are evening stars, but too close to the sun for successful observation.

SATURN must be looked for as soon as it is dark enough to be found.

NEPTUNE rises about 11 p.m. at the beginning of the month, and about two hours earlier at the end.

METEORS may be seen about September 1st, 2nd, 6th, 7th, 11th—13th and 25th.

HOLMES' COMET should be looked for on every available opportunity, and when once found, carefully watched for change. It will probably be seen on September 1st, not very far from the third magnitude, variable, double star, β Persei.

CODDINGTON'S COMET.—On the 1st it should be placed about a degree and a half north-west of the north-western star β of Orion's belt.

ALLEGHENY OBSERVATORY, Pennsylvania, over which Professor F. L. O. Wadsworth was recently appointed director, is having a 30in. achromatic constructed for it by Mr. Brashear. Subscriptions have been sent in to such a sum, that the observatory will be enabled to occupy a prominent place so far as instrumental appliances are concerned. Astro-physical observations will be the object of its work.

THE MCCLEAN EQUATORIAL at the Cape observatory, has a first-class visual telescope of 18 inches aperture. The 24in. photographic telescope is, however, not so good, for its outer portions give objects a coma, and in other ways also it is not satisfactory, but Sir Howard Grubb is going to again take it in hand to cure its imperfections.

NEW MINOR PLANET.—Professor Max Wolf, on July 17th, at Heidelberg, picked up a tiny planet, if it proves to be new, the known list is 445.

SATURN AND HIS RINGS.—The Spectra given by the planet and the rings, according to Professor George E. Hale, of the Yerkes observatory, are found to sensibly differ. A dark band, readily visible in the red portion of the spectrum of the planet, at wavelength 6183 (Vogel), is absent in that of the rings, seeming to demonstrate the absence of the absorption due to an atmosphere to those appendages.

YERKES OBSERVATORY.—A conference of astronomers and astro-physicists is to be held here on the 6th and 8th of September.

MARS IN 1898 AND 1899.—MM. Camile Flammarion and Eugene A. Antoniadi have published the results of their observations with the 10·24in. Mailhat telescope at the Juvisy observatory in the "Astronomische Nachrichten," No. 3,581, for July. The paper is illustrated by six drawings and a map, and seems to indicate some well marked changes on the surface.

THE GEODETIC SURVEY OF SOUTH AFRICA is making good progress under the direction of Dr. David Gill, Her Majesty's astronomer at the Cape of Good Hope.

LICK OBSERVATORY. — Numbers 3584-5 of the "Astronomische Nachrichten" are almost entirely taken up with the results of double star observations by Mr. R. G. Aitken, at this observatory during 1898. Many of the measurements were made at the request of Professor S. W. Burnham, who is now printing a general catalogue. Mr. Aitken makes it a rule to only use the 36 inch for such stars as are beyond the reach of the 12 inch.

PROFESSOR ROBERT WILHELM EBERHARD BUNSEN, who together with Kirchoff did so much towards establishing the true meaning of the lines visible in the spectrum, passed away on August 16th, at Heidelberg, in his 88th year. He was born Göttingen in 1811.

MR. F. C. DENNETT has removed from 60, Lenthall Road, Dalston, N.E., to 141, Essex Road, London, N.

CHAPTERS FOR YOUNG ASTRONOMERS.

By Frank C. Dennett.

TELESCOPIC APPARATUS.

(Continued from page 93.)

The spectroscope is another piece of apparatus that has revolutionized astronomical work. This in its simplest form consists of a fine slit placed accurately in the focus of an achromatic convex lens. This slit is then examined through a prism, preferably made of dense flint glass, with the edge parallel to the slit as shown in the accompanying diagram (Fig. 1). A is the slit, B, the colimating lens, C the

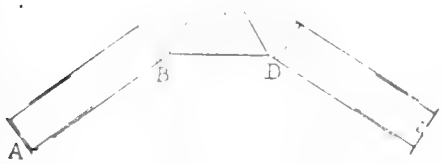


Fig. 1.—Diagram of Spectroscope.

prism, and D the telescope. By increasing the number of prisms, the amount of the dispersion is increased when the light is sufficient. When very great dispersion is not, for the use of the amateur, required, the direct vision spectroscope is much the

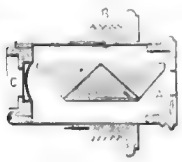


Fig. 3

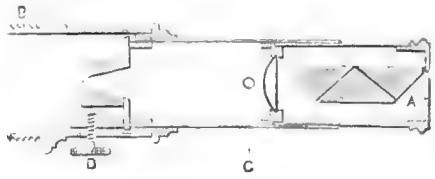


Fig. 2.

most convenient. These have three, five, or seven prisms, some of dense flint glass and others of glass having much less dispersive power, arranged in such a way that the light although dispersed, is not bent, as when the simple prism is employed. When used with the telescope the object under observation is accurately focussed upon the slit. The image of a star is however only a point, so that its spectrum would simply appear as a brilliant coloured line, too thin for its lines to be observed. To overcome this difficulty a cylindrical lens is employed, which changes the figure of the star from a point to a short line. If the line be made to coincide with the slit, the spectrum, if sufficiently brilliant, may be readily observed.

One of the most convenient forms is the McClean. It can be used either for sun, planets, nebulae or stars, and with any telescope from 3in. aperture upwards. For the stars no slit is required, a concave cylindrical lens, within the focus of the object glass, turns their images into short brilliant lines, which by means of a direct vision prism are spread out into a neat spectrum. Fig. 2 shows the arrangement: A being the direct vision prism; B the adapter screw, and C the cylindrical lens. Thus arranged it screws into the telescope like an ordinary eyepiece. Nebulae may receive a preliminary examination without a slit, gaseous nebulae retaining their form, whilst the stellar lines are spread into a band. One great advantage of this form of star spectroscope is, that it may be used not only with the equatorially mounted telescope, but even with an altazimuth. An adjustable slit, with a colimating lens may be placed in front of the prism instead of the cylindrical lens. The slit being in the focus of the objec' glass; then other objects may be examined. The next diagram (Fig. 3) shows the form of the arrangement. A is the prism, B the adapter, C the convex lens, and D the slit with a screw to enable its opening to be regulated. The dispersion is not however sufficient to permit of the observation of the forms of the solar prominences, though the bright hydrogen lines indicating their presence may sometimes be seen.

It will be well to say a word or two about dispersion. The spectrum is really made up of a multitude of images of the slit, each ray, of every degree of refrangibility, recording its own image. Notwithstanding that the slit is often less than one-threehundredth of an inch open, these tiny images overlap to a great extent. The effect of increased dispersion is in some measure to overcome this overlapping. The two figures below (Figs. 4 and 5) illustrate the effect, the upper figure shows the spectrum spread over nearly double the length of the lower one. The consequence of this is to permit many finer lines to become visible, and several that appeared single to be doubled. When the sun is under observation great dispersion may be used, which will of course decrease the brilliance of the light, and so permit of the slit being opened sufficiently to allow the forms, as well as the presence, of the solar prominences to be seen. For further explanations of the spectroscope I cannot do better than refer the reader to the late Richard A. Proctor's little shilling manual on "The Spectroscope and its Work," and John Browning's "How to Work with the Spectroscope."

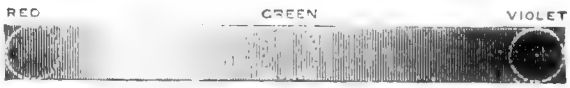


Fig. 4.

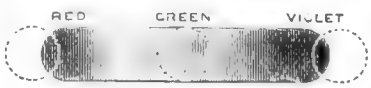


Fig. 5.

J. Browising's, MacClean's Spectroscope.

Before leaving the spectroscope I would suggest a frequent examination of the northern heavens, on clear nights; especially if they appear at all light. If there be any trace of aurora, its presence will be quickly seen by its characteristic bright lines, if the slit be adjusted slightly more open than when used in the daytime. If the telescope be equatorially mounted, photography may be executed both of the sun and moon. A convenient attachment is supplied for this purpose by Messrs. Horne and Thornthwaite. If stellar photography be attempted, a good driving clock is an indispensable adjunct. When the stellar photographs are being taken at the Greenwich Observatory, not only is the clockwork going, but the star is watched in the finder all the time, by an assistant holding an electric controller in his hand, so as to speed or retard the clock if necessary.

(*To be continued.*)

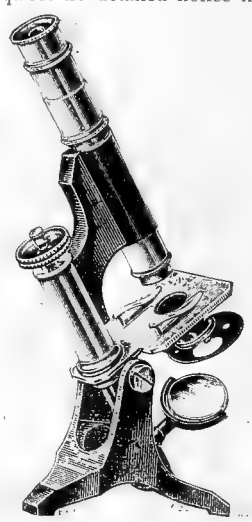
MICROSCOPY

CONDUCTED BY F. SHILLINGTON SCALES, F.R.M.S.

PARASITES OF HOUSE FLY.—In regard to the note in SCIENCE-GOSSIP on parasites of house flies and birds (*ante* p. 87), a parasite which may be identical with the one mentioned was extremely common on the house flies in Bermuda. It is, I believe, a species of *Trombidium*. Those that I noticed could move rapidly over the body of the fly, and when disturbed concealed themselves under the halteres. At other times they appeared to usually attach themselves to the abdomen of the host. The parasite was of a red colour. Another curious parasite which I observed on the house fly in Bermuda was a small red ant. This creature attaches itself to the tarsus of the fly by means of its mandibles. It was a matter of common observation to see flies on the wing with these small ants attached. On one occasion I disengaged the ant and placed it on a table. It remained quiet until a fly came within suitable distance, when it made a rush, and was carried off clinging to the leg of the fly. I believe the reason of attack was made for the purpose of finally eating the fly. The ant hung on until its host became exhausted, and then attacked a more vital spot than the foot, and killed it. These ants eat the soft parts out of a dead cockroach in a very short time. The *Empusa muscae* is a well-known fungoid parasite of the house-fly. The fungus "rests" during the hot weather in Bermuda, but during the cool weather it decimates these insects. I believe that I succeeded in reducing the numbers of flies in my house by placing bodies of some dead from *Empusa* in a suitable cage. I then introduced many healthy ones. In a few days these became injected, and I let them out in order to communicate the disease to others. The result was that the walls of the rooms were soon covered by flies dead from the *Empusa* disease. Mr. A. D. Michael, F.R.M.S., etc., if I remember rightly, once told me that it was his custom to style the common house-fly a "menagerie in miniature," because of the number of parasites to which it acts as host.—*H. A. Cummins, Major R.A.M.C.*, 29, *Nightingale Place, Woolwich.*

MICROSCOPICAL PREPARATIONS.—Mr. Abraham Flatters, of 16-18, Church Road, Longsight, Manchester, has sent us new catalogues of his well-known microscopical and lantern slides. The catalogue of microscopical slides includes both botanical and zoological subjects, and we would call attention to a series of 48 slides, especially arranged to meet the requirements of pharmaceutical students, and sold at the very moderate price of a guinea. We have had an opportunity of examining these, and found them uniformly good, while some are really excellent, such as slides showing karyokinetic division in developing tissue, a section of the root of *Phajus grandifolius*, showing cell contents, sections of the male cone of *Pinus silvestris*, and of the fertile spike of *Selaginella martensii*. Many of the sections are double stained, and one of potato is worthy of notice as being stained with Mr. Flatters' "Gossypimine" stain, which differentiates starch granules most beautifully, and appears to be practically permanent. The stain itself can be obtained from Mr. Flatters direct, as well as other mounting stains, cements, and requisites, amongst which we may mention a new elastic black cement for finishing slides with one ring. The catalogue of lantern slides represents very fully zoology, botany, geology, physical geography, and such special subjects as insect metamorphoses, evolution, mimicry, etc. It is unusually complete. The slides, both lantern and microscopical, are sold at the modest price of 6s. per dozen, and are in no way inferior to those at double the price elsewhere.

MR. J. J. BROWNING'S CATALOGUE. — Mr. Browning's catalogue contains many things of interest to microscopists. His micro-spectroscopic apparatus is well-known and requires no detailed notice here, but amongst the now numerous pocket aplanatic lenses in the market we may mention his Platyscopic lenses which were amongst the earliest in the field, and still hold their own. A useful novelty is Mr. Browning's small micro-camera, concerning which we hope to give our readers further information after a practical trial of its efficiency. Amongst microscopes we may mention the "Iris," fitted with sliding coarse adjustment, micrometer screw fine adjustment, draw-tube, diaphragm plate, and tube for sub-stage apparatus. It is sold with one eye-piece for the modest sum of £2 17s. 6d.



THE "IRIS" MICROSCOPE.

ZEISS' NEW CATALOGUE. — Carl Zeiss' Catalogue for 1898 is worthy of the reputation of the firm. Beautifully printed and bound, excellently arranged, and completely illustrated, it is more than a catalogue in virtue of the practical explanatory remarks interspersed in the text. Of the eminence of this firm, pre-eminent as makers of the famous apo-chromatic objectives, it is unnecessary to speak, but their catalogue gives detailed information with regard to their stands, objectives, eyepieces, and accessories, and should be in every worker's hands.

MR. J. J. HICKS' CATALOGUE.—Mr. Hicks, of Hatton Garden, is well known as a maker both of microscopes and objectives, and his catalogue therefore scarcely requires detailed notice. Microscopes ranging from £22 10s. to £3 17s. 6d. are listed. We may mention what appears to be a comparatively new model in his "Histological" microscope, which is fitted with rack-work coarse adjustment and micrometer-screw fine adjustment, stage with the Nelson type of horse-shoe opening, swinging understage fitment for condenser, and claw-shaped stand. It is sold at a price that brings it well within the reach of students.

NOTE.—In consequence of pressure on our space, upwards of a column of "Microscopy Notes" have unavoidably to stand over until next month. These include one upon pond life at Richmond Park and others of interest.

MICROSCOPY FOR BEGINNERS.

By F. Shillington Scales, F.R.M.S.

(*Continued from page 88.*)

The last stands which we can mention in detail must be the "Fram" and "Edinburgh" stands of Messrs. Watson and Sons, of High Holborn. The "Fram" stand is quite a new model. It is on a tripod like the preceding, has a coarse adjustment by rack and pinion, and a particularly sensitive and steady lever fine adjustment. There is also a draw-tube, extending from 150 to 250 mm., fitting for sub-stage apparatus of the society size, and so arranged as to swing out of the optic axis when desired, also the usual mirrors. With one eye-piece, inch and ⅔ inch objectives, Abbe illuminator, with iris diaphragm, stop and carrier for same, etc., and mahogany case complete, the price is £8 5s. The stand alone, with one eye-piece, costs £4.

This firm's "Edinburgh" stand is one concerning which we can speak highly from personal knowledge, and it is capable of almost any work of original research. It is a larger stand than the foregoing, and is made in many forms, but the "G" model, with rack and pinion focussing sub-stage, in addition to the requirements mentioned above, would cost £12.

Fram Microscope.

Edinburgh Students Microscope.

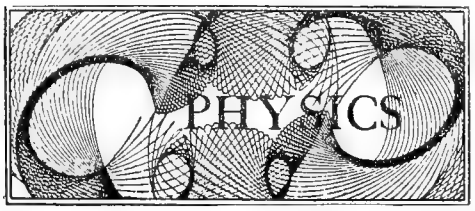
We cannot, for want of space, mention in detail the stands of Messrs. Baker, Collins, Crouch, Newton, etc., in England, or those of Zeiss, Leitz, Reichert, Bausch and Lomb, etc., abroad. We may be pardoned if we express here our opinion, formed by practical observation, that the best English stands are, on the whole, preferable to those of Continental make. We are aware that this statement runs counter to the belief of too many science teachers, but it will be supported by the opinion of those whose work makes it necessary for them to use the microscope as more than a mere magnifying glass. Even now, when the English condenser has become so universal, we see microscopes by foreign opticians of repute sold without condenser fittings, and even without a joint by which the microscope can be inclined at will, while the stand has invariably the horse-shoe foot, with a more or less top-heavy stage above it.

We have purposely given examples and quoted prices of microscopes fitted with all the essentials enumerated in our preceding papers, because they are essentials in a modern microscope. Of course, money at first cost may be saved by buying, for instance, a microscope without a condenser, as in the pretentious stands one meets in every other optician's window; but it is to save the beginner from the mistake of making such purchases that these papers are mainly written. Keeping in view also our desire to obtain a stand that can be used for serious practical work, we have not alluded to the binocular, which, convenient as it is and beautiful as are the images it gives, is not suited to our purpose on account of its practically fixed tube length. The binocular itself can only be used with objectives up to about ½in. focus, or, say, 40° air-angle.

On the score of expense also we have not mentioned mechanical stages, though most of the foregoing microscopes could be fitted with them. They are convenient, but are only essential for certain work. A small sliding stage, however, costing about 10s. upwards, is well worth the extra expense.

Having selected our stand, it now becomes necessary to speak of the objectives. The improvement in these of late years has been enormous. For a reasonable sum the microscopist can now get objectives with a definition that leaves but little to be desired. As we wish to keep entirely free from technicalities, we will not go into the difference between *apochromatics* and *achromatics*, further than to say, that the former, if genuine, are quite free from all outstanding colour, and give unsurpassed definition, whilst they also bear heavy eye-piecing more satisfactorily than the achromatics. On the other hand, their price is prohibitive to most students, a ⅛in. oil immersion by Zeiss costing £15 to £20, according to its aperture. The reader may rest assured that good achromatics, by first-class makers, will show him almost all that the microscope is capable of revealing, and we could mention specifically not a few achromatics by individual makers whose performance on really critical tests compares very closely indeed with that of the apochromatics. The selection of the objectives is, however, a most important matter, and the advice of a really competent friend is invaluable. Certain makers are well known for objectives of certain powers, and we strongly recommend the beginner to get his objectives only from the very foremost makers. The best all-round objective for the beginner is the inch, after that the ½in. or ⅔in.—the former for preference for botanical work, the latter for human histology. As the worker becomes further advanced he will wish to add others. The 2in. is a most useful lens, as it takes in a large field, the ¼in. comes in between the 1in. and the ⅓in., and an ⅛in. (dry) is useful in certain circumstances. Any higher power than this should be an "immersion" lens, either water or oil, and the most frequently met with is a 1/12in. oil immersion. But the beginner is not advised to get really high powers until he actually requires them. He will find that mere magnification is by no means the main object in microscopical work, and that the real worker invariably uses the lowest possible power.

(*To be continued.*)



CONDUCTED BY JAMES QUICK.

NEWTON AND OPTICS.—The Rede lecture upon "The Wave Theory of Light," was delivered at Cambridge in July by Professor A. Cornu, on the occasion of the Jubilee celebration of Sir G. Stokes as Lucasian professor. The French savant sketched in an absorbing and brilliant manner the history of the theories of Light from the ancients, down through Boyle, Descartes, Newton, Young, and Fresnel, to our present physicists. He naturally laid stress upon the thoughts of Sir Isaac Newton and Augustin Fresnel as foremost workers of their time. Professor Cornu dilated upon the troubled mind of the former in endeavouring to apply at one time the emission theory, then the theory of fits, then again the undulatory theory to the elucidation of optical problems. Indeed, Thos. Young cites some of Newton's "Queries" as proof of the final conversion of Newton to the wave theory. Although it is to Thos. Young we owe the discovery in 1801 of the true wave nature of light, yet it was the illustrous Fresnel who so vigorously pursued it, and to his investigations it is in a great measure due that the wave theory of Light was so firmly established.

PHOTOGRAPHY AT LOW TEMPERATURES. — According to MM. Lumière, a great decrease in the sensitiveness of photographic plates takes place at low temperatures. Their experiments show that some ultra-sensitive photo-plates cooled to — 191° C. require from 350 to 400 times as long an exposure to light to produce a given effect, as is taken at ordinary temperatures. Most sensitive photographic preparations are not acted upon at all under such cold conditions. The plates, however, are not permanently affected by the cooling.

FLUORESCENT SOLID SOLUTIONS.—In an interest-contribution to "Comptes Rendus" 128, J. R. Mourelo gives the results of his experiments upon fluorescent substances. Taking various mixtures, he finds that the best results are obtained with strontium carbonate 100 grams, flowers of sulphur 33 grams, sodium carbonate 1·4 gram, fused sodium chloride 0·85 gram, manganese carbonate 0·15 gram. This mixture is finely powdered, compressed, and placed in an earthenware crucible. It is kept at a red heat for three hours and then allowed to cool slowly. If it is then exposed to daylight it shows a brilliant green fluorescence.

MEASUREMENT OF THERMAL CONDUCTIVITY.—Further experiments have been made to determine the thermal conductivity of various substances. An arrangement used recently by Dr. C. H. Lees consisted of a disc of the material whose conductivity was to be determined, having a copper disc placed upon one face, while upon the other were applied a pair of copper discs, having between them an electrical heating coil of platinoid wire. The discs were all the same diameter. Radial holes were bored into each copper disc and thermo-junctions inserted, so that the differences of temperature could be measured by balancing the differences of potential produced, against known potential differences on a potentiometer. Dr. Lees summarised some of his results as follows:—1. Solids, which are not very good conductors of heat, in general decrease in conductivity with increase of temperature in the neighbourhood of 40° C. Glass is an exception to this rule. 2. Liquids, in the neighbourhood of 30° C. follow the same law. 3. The conductivity of a substance does not invariably change abruptly at the melting point.

CONTACT BREAK FOR INDUCTION COILS.—The spring contact break is now generally regarded as quite unsuitable for large induction coils, having given place to mercury breaks and more recently to the Wehnelt electrolytic break (*vide* S.-G., May, 1899, p. 372). For coils giving up to about 3in. or 4in. sparks, however, the spring break may be advantageously used. A modified form has recently been introduced having two contacts instead of one, so that as the spring vibrates it closes and opens the circuit twice during each complete oscillation. The frequency of break is thus doubled for the same period of vibration of the spring.

ELECTROPLATING THE HULLS OF VESSELS.—A satisfactory report has recently been submitted to the United States Government upon a four years' test of Crane's system of copperplating the hulls of vessels. The ocean tug "Assistance" was electroplated, and launched in February, 1895. Quite recently she was docked and subjected to a critical examination, when it was found that her bottom was absolutely free from marine growth of any kind. Flexible shallow baths are used in the process in order to conform to the curvature of the ship. These baths, with suitable watertight packing, are fixed to the sides of the ship like snails. The ship forms the negative pole, the plating-bath the positive, and the plating is done in overlapping sections so as to form a continuous coating. It is thus possible to plate the bottom of a ship 400ft. long in eight or nine days. The electricians suggest in their report that not less than one-sixteenth of an inch of copper should be allowed. It is claimed that as much as £4,000 per annum is expended by various ships in the trans-Atlantic trade to overcome the added friction caused by fouling, while the cost of docking a big vessel twice a year, would nearly double the total loss as a penalty for unprotected bottoms. An iron vessel with a speed of 20 knots, if coated with copper, will have, it is calculated, a speed of 21 knots.

GLASS AND PORCELAIN INSULATORS.—Up to the present time porcelain insulators have been most generally used for telegraph and telephone work on account of the hygroscopic nature of glass. Recently, however, insulators have been made of a coarse kind of glass, its composition being a trade secret, which do not condense any film of moisture on their surface. Experiments with these appear to show conclusively, that they are much superior to porcelain.

PRINTING BY RÖNTGEN RAYS.—A process, known as the Izambard process, has been brought forward for printing by X-rays. A number of sheets of sensitized paper are piled one on the top of the other, and between the pile and the source of X-rays is placed the copy, printed or written in ink made in part of finely divided metallic or calcareous powder. Bronze, copper, or white lead may be used. For a writing ink, white lead in a solution of gum; for a type-writing ink, metallic powder mixed with boiled linseed oil. An improvement recently made upon the Izambard process consists in making the paper in a continuous strip, and sensitizing it in page sections alternately on opposite sides, in such a way that, when folded, each section will still retain the features of a single sheet.

SCIENCE ABROAD

CONTRIBUTED BY FLORA WINSTONE.

PROCEEDINGS OF ACADEMY OF NATURAL SCIENCES (Philadelphia), August 8th. This number contains some notes on Coccidae by Prof. T. D. A. Cockerell. He describes several new genera, and also gives detailed measurements of *Dactylopius calceolaria* and *D. sacchari*, two sugar-cane mealy-bugs, that have not hitherto been fully described. Mr. Witmer Stone writes on a collection of birds from Bogota and on the South American species of *Speotyto* and *Troglodytes*. Mr. Witmer Stone after giving a list, and in some cases descriptions, says that it is with hesitation he ventures to propose the name *Troglodytes columbae* for a new species of South American wrens as there is already such a long list. This species however, found near Bogota, is so different to any described form, that there seems no alternative. The writer gives a careful description of the differences between the better known species of *Troglodytes*. Mr. Henry A. Pilsbry contributes a few notes on "North-West American Land Snails" figuring *Vertigo gouldii* v. *lagganensis* a new variety found in Alberta, *Vertigo andrusiana* a new species from Douglas county, south-west Oregon, and for the purposes of comparison with the two former, a specimen of *V. binneyana* from Winnipeg.

THE VICTORIAN NATURALIST (Melbourne), July. Mr. J. Shephard and Mr. W. Strickland describe with illustration a new rotifer *Melicerta fimbriata* obtained in a gathering from the Botanical Gardens, Melbourne. It was found on stems of *Nitella* in company with *M. ringens*, several species of *Limnia* and *Stephanoceros eichornii*, then observed for the first time in Victoria. At first sight the general appearance suggested *Melicerta tubicolaria*, but on closer examination it differed in the following points; the ventral antennae were shorter, the position and form of the dorsal antennae differs as does the terminal peduncle. The chief differentiation is in the structure of the tube, which is constructed of fibres formed in the ciliated cup and arranged radially. The length of the animal was 1 mm.

BULLETIN DE LA SOCIETÉ PHILOMATIQUE (Paris), 1899. This number is the first of a new series of the Bulletin of the Society. It contains some notes by M. Giacomo Candado on Rectilinear Trigonometry, explaining a new system, which he claims is a simple and expeditious method of working out these problems. M. E. L Bouvier occupies the remainder of the Bulletin with the second part of his article on the crustaceous parasites of the genus *Dolops* of Audouin. It is illustrated by twenty figures. The object of the article is to make known for the first time the specific characters of this genus and thus facilitate the discovery of new forms. The writer however ventures to suggest some generalizations relative to the affinities of these animals and also their probable origin from the Argulidae.

LES MOIS SCIENTIFIQUE ET INDUSTRIEL (Paris), July, contains some interesting articles on Lighting and Automobilism, also notes on Engineering and Applied Science from American, German, French, Italian, Spanish, English and Dutch scientific journals.

NOTES & QUERIES

CAUSE OF SINGING IN SYRPHIDAE.—I have lately been keeping in captivity all the species of Syrphidae I could obtain, in order to observe their habits. They are kept in a very large box with a glass lid and holes in the sides covered with veiling for ventilation. Yesterday I heard a shrill singing noise, although none were flying, nor did they appear to be vibrating their wings. I then took up one, moistened its wings, and placed it so that it stuck to my finger by its wings, and certainly could not move them in the least. The singing gave place to a jarring noise, as I was evidently interfering in some way with the production of the song. I then looked closely, and suddenly saw two little white projections which I can best compare to miniature drumsticks, one on each side of the thorax where it it is joined to the abdomen. They were vibrating rapidly against the wings, and it was evident that here was the true cause of the singing noise. I afterwards found on holding the insect, in such manner its wings were free to move, that this did cause them to vibrate slightly, but it was scarcely perceptible. The bases of these projections are brown, and they each have a white bulb at the end, in some species it is greenish or yellowish. The one on which I first observed them was *Syrphus ribesii*, but I have since found that six other species possess them, and see no reason to doubt that all species of Syrphidae have them. I have heard seven or eight species singing, they usually do when picked up, but I have also frequently heard them when resting on a leaf. The note emitted seems to be the same in all species, although that produced when flying varies considerably. I might have mentioned that all the syrphidae make a particularly loud noise when seized. The vibrations can be distinctly felt in the fingers, and make the insect rather difficult to hold. I think, quite possibly, one reason that they make this noise is to cause birds to drop them. My captives feed on the pollen of Umbelliferae, and many other flowers in which the petals of the corolla are united, so as to form a cap or hood, especially on the white *Convolvulus major*. From the way I have seen them eat I think I know the reason why these flowers are arranged to be especially attractive to this sort of fly. I will take as an example a large syrphus I observed this morning feeding on the convolvulus. It already had many grains of pollen sticking to the down on its thorax, a good deal of which fell on to the stigma as it entered the flower. I have seen one syrphus actually stand and clean off the pollen sticking to it, with its legs, right over the stigma. It then began to eat the pollen off the anthers, and in so doing brushed its back against the inside of the corolla, getting covered with the pollen which was there. As is very often the case in the convolvulus, the grains appear to fall off the anthers into the inside of the flower. Presently it turned round to eat some of this pollen and then got a shower from the anthers, so in the end it flew away with about as much pollen as it had eaten. These flowers thus make what appears to be an enemy into a friend.—*F. J. Hughes, Norman Court, Southsea, 14th August*, 1899.

CORRESPONDENCE.

At the suggestion of several correspondents we open with this volume a department in which our readers may address the Editor in letter form. We have pleasure in inviting any who desire to raise discussions on scientific subjects, to address their letters to the Editor, at 110, Strand, London, W.C. Our only restriction will be, in case the correspondence exceeds the bounds of courtesy; which we trust is a matter of great improbability. These letters may be anonymous. In that case they must be accompanied by the full name and address of the writer, not for publication, but as an earnest of good faith. The Editor does not hold himself responsible for the opinions of the correspondents.—*Ed. S.-G.*

Exchange Clubs.

To the Editor of SCIENCE-GOSSIP.

Sir,—With regard to the letter on this subject in July Science-Gossip (*ante* p. 63), I may mention that some years ago it was suggested to me by Mr. E. L. Layard, C.M.G., that I should devote the cover of the "Journal of Malacology" to lists of duplicate shells, in connection with a possible Exchange Club. This latter was to be on the lines of the Stamp Clubs, and I was very much inclined to take it up. The difficulty in the way was one pointed out from the beginning by Mr. Layard, and had reference to the values of shells. If more valuable stamps are taken out of the circulating "basket" than are put in, the exchanger can pay the difference based on current prices, to the Secretary at the end of the month. There are no complete lists of prices to be applied to shells at present, and we must I think continue to exchange in the old friendly way, where one gets the advantage, as a rule on the bargain, or compile a standard list, thus conducting the proceedings on a purely business basis. In the lepidopterists' clubs, I fancy there is the objection that the first to receive the baskets may have it all their own way.

Yours, etc.,

Wilfred Mark Webb.

NOTICES OF SOCIETIES.

*Ordinary meetings are marked †, excursions *; names of persons following excursions are of Conductors. § Lantern Illustrations.*

North London Natural History Society.
Sept. 16.—*Epping Forest. L. J. Tremayne.
,, 21.—†Fruits and Seeds on their travels. H. W. S. Worsley Benison, F.L.S.
Oct. 5.—†Pocket Box, Microscope and Lantern Exhibition.
,, 7.—*Kew Gardens. L. B. Prout.
,, 19.—†Notes and Echoes. F. W. Frost.

Selborne Society—Croydon and Norwood Branch.
Sep. 16.—*Mitcham Common to River Wandle.

Yorkshire Naturalists' Union.
Sept. —*Fungus Foray, Campsall Woods.
Oct. —†Annual Meeting at Harrogate.

Preston Scientific Society.
Sept. 7.—*Port Sunlight. E. C. Booth.
,, 23.—*Ribchester. J. J. Bramwell.
W. H. Heathcote, F.L.S., Hon. Sec., 47, Frenchwood Street.

Nottingham Natural Science Rambling Club.
Sept. 9.—*Radcliffe-on-Trent.
Oct. 28.—†Annual Meeting, Natural Science, Laboratory University College.
W. Pickerton, Hon. Sec., 187, Knowle Street.

Tunbridge Wells Natural History and Philosophical Society.
Sept. 2.—*Pembury and the Borough Waterworks. H. S. Roberton.
,, 30.—(?)*Fungus Foray. R. R. Hutchinson.
Hon. Sec., R. R. Hutchinson, 28, Princes Street,

North Kent Natural History Society.
Sept. 2.—*Field Ramble.
,, 6.—†Land and Freshwater Shells. J. Stacey.
,, 20.—†Deep Sea Life. A. J. Jenkins, M.C.S.
Oct. 4.—†Breathing Organs. C. Dyes.
,, 7.—*Field Ramble.
,, 18.—†Microscopic Wonders from Ponds and Ditches. T. W. Brown.
T. W. Brown, Hon. Sec., Rosemount, 80, Church Lane, Old Charlton.

Geologists' Association of London. *Excursions.*
Sept. 9.—*Charlton, Erith and Crayford. W. Whitaker, B.A., F.R.S., P.G.S.
,, 11.—*Visit to British Museum, Jermyn Street Museum and Natural History Museum.
Frederick Meeson, Chairman, Excursions Committee, 29, Thurloe Place, South Kensington, S.W.

Hull Scientific and Field Naturalists' Club.
Sep. —*Yorkshire Naturalists' Union Fungus Foray to Barnsley.
,, 6.—†"An Anglo-Saxon Garden." J. R. Boyle, F.S.A.
,, 20.—Annual Meeting.

IMPORTANT NOTICE.

The Proprietor of Science-Gossip having decided to manage the business department from independent offices at 110, Strand, London, W.C., all subscriptions, advertisements and payment for advertisements must in future be sent to that address, and no longer to the Nassau Press, which latterly managed the commercial department for the proprietor.

Subscriptions (6s. 6d.) for Vol. VI. are now due. The postage of Science-Gossip is really one penny, but only half that rate is charged to subscribers.

NOTICES TO CORRESPONDENTS.

To Correspondents and Exchangers.—Science-Gossip is published on the 25th of each month. All notes or other communications should reach us not later than the 18th of the month for insertion in the following number. No communications can be inserted or noticed without full name and address of writer. Notices of changes of address admitted free.

Business Communications.—All Business communications relating to Science-Gossip must be addressed to the Proprietor of Science-Gossip, 110, Strand, London.

Subscriptions.—Subscriptions to Science-Gossip, which may commence with any number, at the rate of 6*s.* 6*d.* for twelve months (including postage), should be remitted to the Office, 110, Strand, London, W.C.

Editorial Communications, articles, books for review, instruments for notice, specimens for identification, &c., to be addressed to John T. Carrington, 110, Strand, London, W.C.

The Editor will be pleased to answer questions and name specimens through the Correspondence column of the magazine. Specimens, in good condition, of not more than three species to be sent at one time, *carriage paid*. Duplicates only to be sent, which will not be returned, unless accompanied by return postage, and then at owner's risk. The specimens must have identifying numbers attached, together with locality, date, and particulars of capture.

The Editor is not responsible for unused MSS., neither can he undertake to return them, unless accompanied with stamps for return postage.

ANSWERS TO CORRESPONDENTS.

C.G.S-M. (London, W.C.)—Your question should be addressed to a medical paper. We imagine that the experiments you suggest have long ago been carried through with affirmative results. Note our change of address.

EXCHANGES.

Notice.—Exchanges extending to thirty words (including name and address) admitted free, but additional words must be prepaid at the rate of threepence for every seven words or less.

Lias Fossils offered in exchange for others.—T. Stock, Frome Hill, Radstock, Bath.

Offered, North and South American diurnal lepidoptera. Also N.A. aboriginal relics, for diurnal lepidoptera from Africa and Australian Islands.—Levi W. Meugel, Reading, Pa., U.S.A., P.O. Box 326.

Offered.—Clutches of Sandlark, Common and Little Terns, Herring, Lesser B-B and Black H Gulls, Corn Crake, Moor Hen and many other British Birds; also a number of United States' birds eggs in clutches; full data given. Wanted Exotic Land Shells, and eggs not in collection. W. J. Farrer, Bassenthwaite, Keswick.

Correspondence wanted in all parts of the world, for exchange of crustacea star-fish, sea urchins, etc.—H. W. Parritt, 8, Whitehall Park, London, N.

Society's Journal of Botany Linnean.—Would exchange vol. xxxiv. Nos. 236-7-8, for Science Gossip new series, vol. iv.—Surgeon K. H. Jones, R.N., H.M.S. "Repulse," Channel Squadron.

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