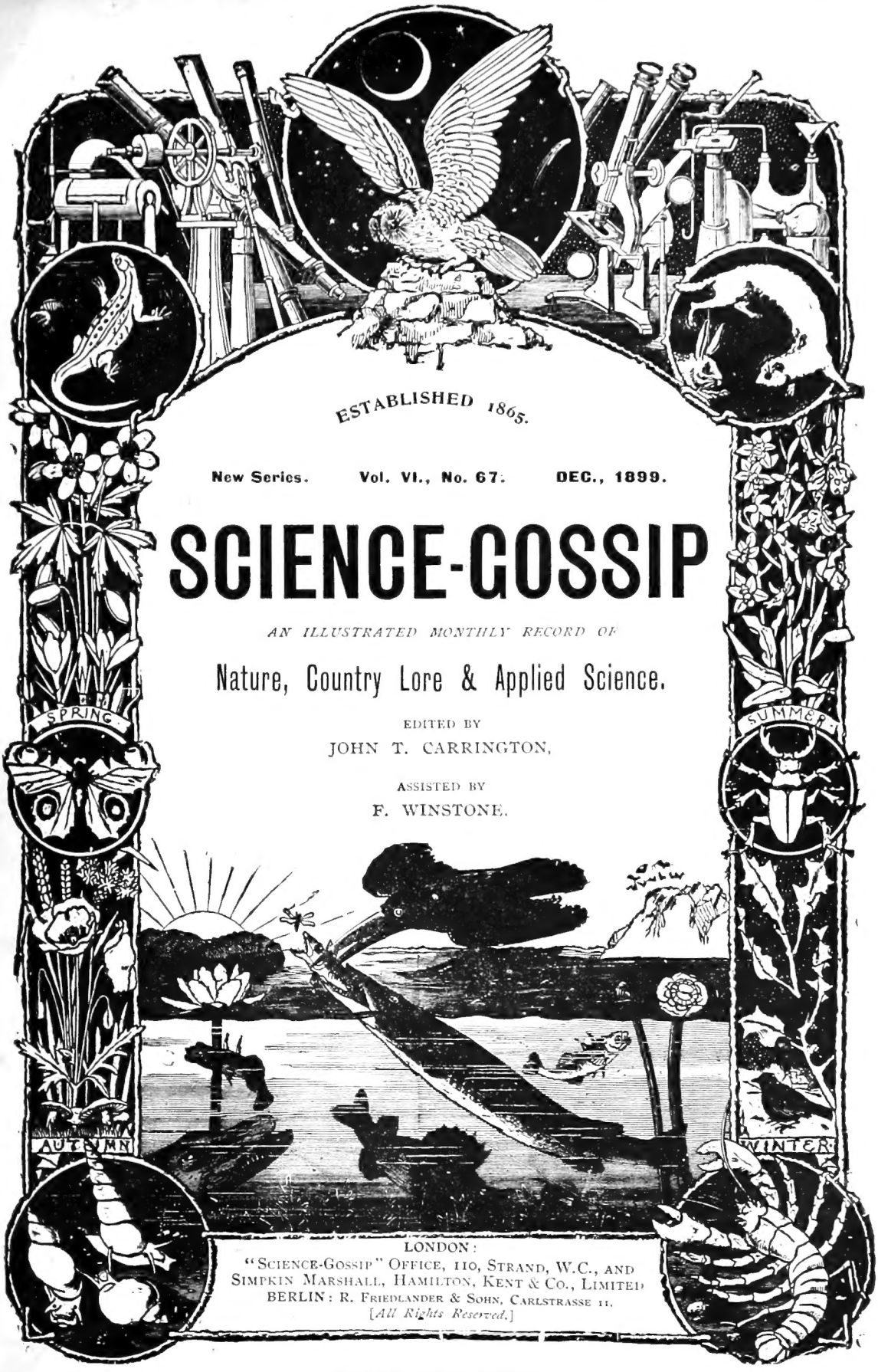

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AN INTRODUCTION TO BRITISH SPIDERS.

By Frank Percy Smith.

Introduction.

I AM chiefly influenced in writing the following introduction to a study of the Spiders of Great Britain, by the impression that there are many workers who would be willing to take up this most interesting, but curiously neglected branch of Natural Science, if they could find means of obtaining some initial information upon the subject, that did not entail too large an expenditure of money. The literature available is generally expensive and out of date, and the classifications adopted are, at first sight, so at variance, that a beginner might well be tempted to give up in despair, and devote his attention to some less intricate group. "The Spiders of Great Britain and Ireland," by John Blackwall, although a fine book in many respects, is rather behind the present knowledge of the subject, and the more recent work "The Spiders of Dorset," by the Rev. O. Pickard-Cambridge, has the disadvantage of containing but few illustrations. The classification of the Aranceidea, especially in the case of the family Theridiidae, has grown more complicated since the publication of the latter work. This is partly owing to the discovery of a large number of new species, but chiefly to the energy of several eminent arachnologists on the Continent, who have divided a few large and most unsatisfactory genera, into a number of smaller and more useful ones.

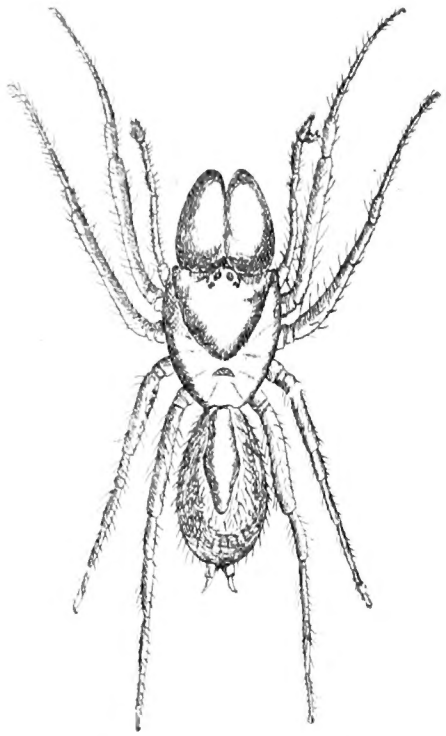


Fig. 1.—*Atypus piceus* (magnified).

Owing to the limited extent of the space at my disposal I shall not be able to give detailed descriptions of species, nor would such a proceeding be here advisable. I shall endeavour, by mentioning various peculiar and distinctive characters, to indicate most of the well-known species. My intention is that these pages shall be, in regard to more pretentious works on the subject, as a handbook for first reference.

In the study of spiders, as in most branches of Natural Science, there are difficulties to be met. I will now proceed to enumerate some of these, and the methods by which they may be overcome. The first that presents itself to a beginner, is the forming of a mental picture of a species from a detailed description. It is possible to partially overcome this by learning the names of the parts of a spider, which are used in such descriptions, and also the purport of the adjectives indicating the form and colour of these sections. The parts enumerated and described in the following list will be sufficient for purposes of identification; but the student is advised to consult more complete descriptions in order to obtain some knowledge concerning the internal anatomy of the Araneidea. A good plan is to examine the external structure of some common spider, corresponding to the following list of the exterior anatomy, by the method hereafter indicated. With regard to the shape and colour of the individual parts, it is impossible, however accurate one may be, to convey an exact impression of their appearance, but this difficulty may to a great extent be obviated by the preparation of carefully-drawn diagrams. The colours of spiders are of secondary importance only, difference of tint, however distinct, simply constituting a variety, providing the structural details are identical. For example, we find that *Theridion lineatum* Clk. is often described as being of a pale yellow or white colour, but it is very possible that a large percentage of captures will have two broad bands of crimson on the abdomen, and I have taken specimens in which these bands were so developed as to occupy the whole of the upper abdominal region, with the exception of a narrow white line along the central portion.

The following list contains all the parts used in the description of families, genera, and species. Fig. 2

consists of drawings taken from *Tegenaria derhamii*, selected as being a well-known and fairly typical spider.

(1) CEPHALO-THORAX. This really consists of the head, known as the *caput*, and the *thorax* fused together. It constitutes the anterior great division of the spider. To this part are attached the legs, which are eight in number. Some writers refer to the upper part of the cephalo-thorax as the *shield*. The *caput* usually has the appearance of a more or less raised portion forced, as a wedge, into the anterior portion of the thorax.

(2) EYES. These are placed on the anterior of upper surface of the caput, and in all British species are either six or eight in number. They are simple, usually of a dark colour, although in many cases they have a beautiful pearly appearance, other tints being occasionally found. The arrangement of the eyes is of the greatest importance in classification, constituting a character for the formation of families and genera. Their comparative size, and very slight difference of position, are usually regarded as specific characters. The position of the eyes on the caput is also important, the following terms being employed in describing the parts concerned :—*Ocular-area*, the space bounded by the eyes; *Clypeus*, the tract extending from the anterior eyes to the lower margin of the caput; *Facial-space*, the ocular area and clypeus combined.

(3) LEGS. As already stated, these are eight in number, and as far as British species are concerned, invariably consist of seven joints, which are named as follows, beginning from the body :—(a) *exinguinal*, (b) *coxal*, (c) *femoral*, (d) *genual*, (e) *tibial*, (f) *metatarsal*, (g) *tarsal*. The exinguinal, coxal, and genual joints are usually much shorter than the remainder. The tarsus terminates with two or three claws, usually pectinated, and beneath this portion is sometimes placed a number of closely-set hairs, known as *scopula*. On the metatarsal joints of the fourth pair of legs, in a few species, a row of short curved bristles will be noticed. These constitute the *calamistrum*, which is used in the preparation of a peculiar flocculent web secreted by a special spinning organ, always present in such spiders. The relative length of the legs is useful as a generic character, the formula 4 1 3 2, for example, indicates that the fourth leg is the longest, the first coming next in order of length, and the second being the shortest. If a leg is accidentally lost, another, but smaller, limb is produced in its place.

FALCES. These are two strong organs placed below and on the front part of the cephalo-thorax. They each terminate in a sharp fang, capable of more or less motion, and containing a minute channel, through which a rapid poison is forced from the fang.

(5) MAXILLAE. These are strong plates situated behind the falces, and with the *labium*—a small plate lying between the maxillae—they form the external parts of the mouth. The maxillae are important as generic characters, as is the labium.

(6) PALPI. These are the two five-jointed limbs springing from the maxillae. In the female they are sometimes used as organs of locomotion. In the male, however, they are highly developed, and employed by the animal for the purpose of transferring the spermal fluid, either directly or indirectly, from its own genital aperture to that of the female. The terminal joint, known as the digital joint, is often very highly developed, consisting of variously shaped corneous receptacles and ducts. The next two joints are known as the radial and cubital respectively, and with the digital joint, are most reliable specific characters. The remaining joints are termed humeral and axillary.

(7) ABDOMEN. This is the posterior great division of the body, and is usually more or less of an oval shape, although subject to great variation in form. The upper surface is generally marked to a greater or less extent, and is commonly clothed with hairs. On the underside, near the anterior portion of both sexes, is the genital aperture. The female organ is rather prominent, and of the greatest importance as a specific character. Its development as a distinct orifice is a sure indication of maturity. The male aperture is similarly placed, but is very small and difficult to distinguish. On each side of the genital area are the external openings of the respiratory apparatus. In most species they are only two in number, but in a few genera there is an extra pair placed nearer the posterior extremity. The abdomen terminates in the spinners, the office of which is to secrete the web. In the case of spiders having calamistra, an extra spinning organ is present. This secretes a peculiar web, which is formed into a flocculent layer surrounding the animal's retreat. The cross lines of many webs, that of *Araneus (Epeira) diadematа* for example, are studded with viscid globules for the better retention of the spider's prey. These globules are not placed separately in position by the spider, but are

DESCRIPTION OF FIG. 2, PAGE 195.

a, Female; *b*, ♀ side view (legs truncated); *c*, Eyes, from above; *d*, Eyes and falces from in front; *e*, Thorax (underside); *f*, Abdomen (underside); *g*, Leg; *h*, Male palpus (profile); *i*, Female genital aperture; *j*, Male palpus from underneath.

Joints of Leg.—1, Exinguinal; 2, Coxal; 3, Femoral; 4, Genual; 5, Tibial; 6, Metatarsal; 7, Tarsal.

Joints of Palpus.—1, Axillary; 2, Humeral; 3, Cubital; 4, Radial; 5, Palpal organs; 6, Digital.

formed apparently from an extremely fine layer of fluid enveloping the thread as it leaves the spinners, which, in accordance with the laws of "surface tension," contracts at regular intervals.

Identification.

I will now proceed to describe the best method of examining a spider with a view to its identification. It does not here fall within my province to describe the technique of microscopical manipulation, but I may say that for this work a strong light is required, and that a series of the most useful objectives, in order, would probably stand thus:—1in., 2in., ½in., ¼in. The first of these is by far the most frequently used, and will be sufficient in most cases. A low power eyepiece will be found least tiring to the eyes.

Take a small dish, such as may be obtained from artists' colourmen, and a quantity of good methylated spirit. The dish should be of a depth sufficient to contain enough spirit to entirely submerge the body of the largest spider. The spirit should be purchased, if possible, from a wholesale chemist, and ought to bear a large dilution with distilled water without clouding. Place the specimen in the dish with the spirit. Then thoroughly examine the requisite parts. The lamp should be arranged with the edge of the flame towards the microscope, and it is necessary to use a large bull's-eye condenser. A few small entomological pins stuck through the abdomen will keep the specimen in the right position. If stage forceps can be arranged to hold the specimen under the spirit, its successful manipulation will be rendered easier. Measurements used are in Millimeters.

The parts should be carefully sketched, and the drawings kept for future reference. The palpi of the males should be examined in several positions, and the apophyses of the radial and cubital joints very carefully drawn. If a specimen cannot be identified at once, the tube containing it should be numbered, a corresponding number being placed on the drawings.

Collection and Preservation.

A few words on the collection and preservation of specimens may be useful. The apparatus required for the collection of spiders depends to a great extent on the collector's fancy. It need not be extensive. A few bottles of spirit, some tubes, about ½in. in diameter, and a pair of forceps, are all that are necessary. A piece of waterproof cloth to kneel upon, when working in moist localities, is a useful precaution against taking cold. A well-known writer wisely advocates the use of a piece of string connecting the cork with the bottle, to obviate the loss of time spent in searching for the cork, when one should be looking for spiders. These animals seem to exercise a vast amount of ingenuity in evading the bottle of the would-be captor, and, consequently, their methods of escape should be carefully noted. The species which run rapidly upon the ground may, after a little practice, be hunted by the right hand into a tube held by the left. If convenient, a few live specimens should be kept in a vivarium at home, and their habits watched. Young specimens of rarities may be reared to maturity in this way.

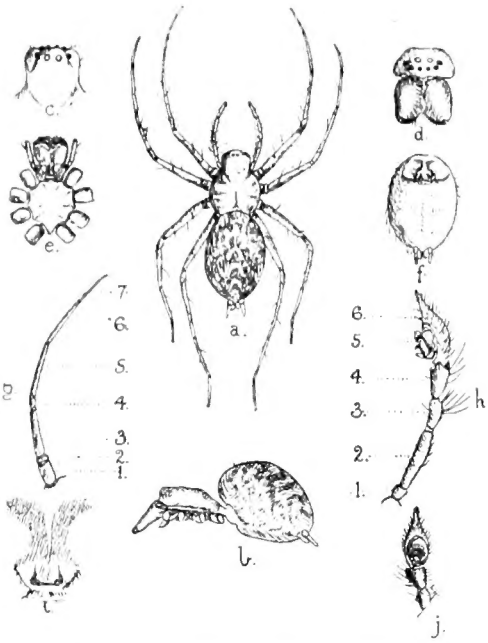
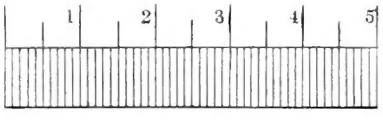


Fig. 2. *Tegenaria derhamii* (magnified).

For description see page 194

In winter and spring spiders are best searched for amongst grass, dead herbage, under pieces of wood, and branches of trees that have lain undisturbed for some time. Turning stones also repays the trouble towards the approach of warm weather. In summer, sweeping grass, rank herbage, and rushes with a strong net, obtains multitudes of specimens. Shaking bushes over an inverted umbrella is productive. The same plan in autumn secures the larger web-spinners. The Thomisidae may be often found resting in composite flowers, where they await their prey.

Spiders are best preserved in methylated spirit, diluted with about 20 per cent. of distilled water. If it is required to arrange the specimens in a natural



Scale of Millimeters.

position, they should be chloroformed, the legs arranged, and the animals immersed in undiluted spirit for a few weeks. Such spiders may be kept in large tubes, or what is better, the oblong jars used in our museums. Some beautiful examples of well-preserved spiders are in the national museum, Brussels.

(To be continued.)

OPIUM,

ITS SOURCE, VARIETIES AND COMPOSITION.

By Lewis Ough.

OPIUM may be described as the juice obtained by incisions from the unripe fruit of the poppy, *Papaver somniferum*, a plant of the natural order Papaveraceae, inspissated by spontaneous evaporation. It has been long known, having been alluded to by Hippocrates and Dioscorides. The former recommends meconin or poppy juice, in certain diseases, and it is supposed that the nepenthes of Homer was opium. The word itself is derived from Otos the juice. It appears to have first been prepared in Asia Minor, from whence a limited knowledge of the drug spread eastward; but there is no record of it as an Indian product, until the beginning of the sixteenth century. Opium is supposed to have been carried into China by Arab traders as early as the ninth century, but it was not until the eighteenth century that the practice of opium smoking began to take root among the Chinese population. Its importation was prohibited in 1820, in consequence of which a regular smuggling trade was established by the East Indian Company, the complications of which culminated in war, and the Nanking Treaty of 1841.

The collection of opium is possible in all countries where there is not an excessive rainfall, the yield being smaller in temperate than in subtropical climates, but the industry can only be profitably carried on where land and labour are cheap and abundant.

The principal varieties of this important drug are (1) Turkey, (2) Indian, (3) Persian, (4) Chinese, (5) European. As the methods of cultivation and collection differ considerably, I propose giving a short description of each.

(1) Turkey Opium. The poppy cultivated in Asia Minor is the variety *glabrum* of *Papaver somniferum*, distinguished by the sub-globular shape of the capsule, and the stigmata or rays at the top of the fruit being ten or twelve in number. The flowers are usually purplish in colour, but are sometimes white, and the seeds like the petals vary in tint from dark violet to white. The seed is mixed with about four times its weight of sand to prevent its being too thickly sown and the mixture scattered broadcast, three sowings generally taking place between the months of October and March, as the crop is very uncertain. With the most careful precautions when the harvest is a full one, quantities of the drug are wasted, owing to the difficulty of gathering the whole in the short time it is possible to collect it. In the plains the flowers expand about the middle of May, but in the uplands not until July. The petals fall in a few hours, after which the capsules grow so rapidly that in from nine to fifteen days they are ready for incision, the fruit then being about 1½ in. in diameter. In the afternoon, transverse incisions are made in the lower part of the fruit, the gentle cut being sometimes carried completely round. Great care has to be exercised to avoid going too deep as if penetrated, the milky juice would flow into the inside of the capsule. The following morning a large poppy leaf is laid on the palm of the hand and with a knife the partially dried juice is carefully scraped off and deposited on the leaf. When a sufficient mass has been collected a second leaf is placed on the top. Each capsule is only cut once, but as all do not arrive at maturity at the same time, it is usual to pass over the field two or three times, so that none be omitted.

After its collection, the opium thus obtained is dried in the shade. When sufficiently solid it is packed in cotton bags with a quantity of the fruit of a species of dock (*Rumex*) to prevent it sticking together. Having been sealed, these bags are forwarded to Smyrna or other port in baskets, and placed in cool warehouses. The bags are afterwards opened and each piece of opium is examined by a public inspector in the presence of both buyer and seller. The quality is judged by appearance, odour, colour and weight. It is divided into three qualities—first, finest; second, current or seconds; and third, chicanli or rejected. The last named is returned to the seller, who disposes of it to merchants for the manufacture of morphine and other alkaloids. The two first-named classes are packed in hermetically sealed tin-lined cases, each containing about 150 lbs. For medicinal preparations of opium such as laudanum, or extract, the Turkey variety alone is used in this country; principally on account of its purity and the large percentage of morphine it contains. Very little of this kind is sent on to China for smoking purposes. A number of varieties of Turkey opium exist in commerce differing in certain particulars, being usually known by the name of the port from which they are shipped, such as Constantinople, Smyrna, etc.; but in English commerce all are divided into shipping, druggists and manufacturing. The former is usually soft, of a yellowish colour internally, and nearly free from poppy *débris* or chaff. It leaves but little insoluble residue when treated with water, and is preferred for smoking and eating purposes. Druggists' opium is firmer and darker, while that termed "manufacturers'" is only used

for the manufacture of its alkaloids, its value being determined by strict chemical analysis. The Turkish government encourage the industry, by remitting the tithes on opium and poppy seeds, for one year, on lands sown for the first time. The officials also distribute printed instructions regarding poppy cultivation and preparation of the juice, where it is pointed out, that opium is ten times more profitable than the growing of wheat.

(2) Indian Opium. The variety usually grown in India is, as in Persia, *Papaver somniferum* var. *album*. In some parts of the Himalayas a red flower variety with black seeds is occasionally seen. In Bengal, opium cultivation is a Government monopoly, and it forms a considerable item in the revenue of our Eastern Empire. The bulk of that produced is exported to China. Any person may undertake the industry, but cultivators are obliged to sell the whole to the Government agent at a definite price previously determined, usually about 3s. 6d. per pound. The authorities re-sell it at about 11s., certainly a very fair profit, although the grower is said to be fully remunerated at the price he receives. In Malwa the cultivation is free, and very profitable, the crop realising from three to seven times, or even more, the value of wheat or other cereals. On entering British territory the opium is heavily taxed, so as to bring its price to that of the Government article.

The seed is sown between the 1st and 15th of November, and germinates in from ten to fifteen days. When two or three inches high the seedlings are thinned and weeded. During growth the plants are very liable to injury from frost, rain, insects and fungi, or the attack of the root parasite *Orobanchi indica*. When about to fall, the petals are collected to make "leaves" for the finished opium, and are dried and pressed for that purpose. They are forwarded to the factories, their value varying from five to ten rupees per maund of 82 2-7th pounds. The collection of the drug begins in Behar about February 25th, and in Malwa in March or April. The capsules are vertically scarified; the cutting instrument or "mashtur" is drawn upwards for each incision, the operation being performed in the afternoon. The opium is collected the following day, a small sheet iron scoop or "seetoah" is used in Bengal for that purpose; and as it becomes full the drug is transferred to an earthenware pot carried for the purpose. A flat scraper is employed in Malwa and linseed oil or water is used to prevent adhesion, but the use of either is said to injure the product, and give rise to more or less of a darkish fluid "passewa," which is allowed to drain off in a tilted shallow earthenware vessel. The mass is next exposed to the air in the shade to harden, being regularly turned over for three or four weeks, when it is taken to the Government factory and examined by a native expert as to colour, aroma, impurities, etc. The price is chiefly regulated by the percentage of moisture present. The opium is then stored in large wooden boxes, each holding about fifty maunds, and is finally transferred to be manufactured into cakes; which process is effected in a somewhat complicated manner. After having been very carefully mixed to ensure the mass being of standard consistence, *i.e.*, 70 per cent. of the dry drug, with 30 per cent. of water, the quantity of opium is weighed out. After being formed into a ball it is enveloped in a crust of dried poppy petals, skilfully agglutinated together by means of a liquid called "lewa," a pasty fluid composed of inferior opium "pasewa" and "dhoe," or washings of the various vessels which have contained opium. The finished balls, usually termed cakes, are quite spherical, have a diameter of about six inches, and weigh about 4¼ lbs. These are rolled in "poppy trash," a mixture of the coarsely powdered stalks, capsules and leaves of the plant, and then placed in earthenware dishes and dried in the sun. These cakes, known as "provision opium," are then packed in cases of about 160 lbs. each for exportation to China, where the bulk of this variety is consumed. For use in India the drug is further dried until it contains only 10 per cent. of moisture, and then formed into cakes of two pounds each in weight, which are wrapped in oiled paper or made into flat square tablets.

(3) Persian Opium is collected from the roundish ovate capsules of the variety *album* of *Papaver somniferum*, which in some districts are incised vertically, and in others diagonally. It is collected in May and June and exported between September and January. After being dried in the sun, that intended for China is mixed with about 4 per cent. of oil, with the object it is said of improving the flavour, whilst that intended for this country is usually without oil. It is met with in England in roundish cones, each from six to eight ounces in weight, and sometimes, but rarely, twice that size. It is firmer and smoother than the opium from Turkey, being beaten into uniform masses, before it is formed into the cones. Only a small proportion of that which is imported into this country is used here, as the bulk is again exported.

(4) Chinese Opium. The white variety of poppy is also principally cultivated in China, though, in the low lands, the red and purple forms are occasionally met with. The seeds are sown in November and December. In the following month the plants are thinned out, and earthed up. After careful weeding and treatment with liquid manure in March and April, the capsules begin to form. In May the opium is collected. Vertical incisions are usually made as in India, but in some parts a vertical shaving is taken off. The juice is scraped off and transferred into a small pot suspended at the waist of the collector. The actual mode of preparation is not known, but from occasional specimens that come under my notice, it appears to have undergone some manipulation, as it has a uniform pasty consistence, without any trace of granular structure like the drug from Turkey. The odour is good and some specimens have oil mixed with them, but it is darker and softer than the

Persian opium. At the present time four-fifths of the drug used in China is home grown. Whilst some is of a treacly consistence, sold in jars, other kinds are made into flat cakes, and wrapped in white paper.

(5) European Opium. It has been experimentally demonstrated that opium, quite as rich in morphine as that produced in the East, can be cultivated in most European countries, even as far north as Sweden. I find it stated that in 1830 a surgeon in Edinburgh obtained 56 lbs. of opium from an acre of poppies, which he sold at 30s. per pound. In France the cultivation is carried on to a limited extent, some specimens yielding over 22 per cent. of morphine, the largest amount of this alkaloid noted in any opium. In Germany the method yielding the best result is to make the incisions soon after sunrise, to collect the juice at once and evaporate as quickly as possible, the percentage of morphine being higher and the drug lighter in colour than when the juice is allowed to dry on the capsules. The cultivation of the poppy in most European countries will however never be carried on to any considerable extent, as the difficulty of obtaining cheap labour in sufficient quantity at the exact time, and the uncertainty of the weather renders its production too much of a speculation.

To be continued.)

A HISTORY OF CHALK.

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

(Continued from page 143).

The Chalk has contributed, to no slight extent, in the formation of the characteristic scenery of a large portion of England. On the principle which obtains that the harder the stratum, the less the denudation, we have the Chalk as one of the few formations which have contributed to hill scenery in Great Britain. In this connection, it stands almost equally in importance with the oolites of the Jurassic age, or the Carboniferous Limestone.

The smoothness and regularity of the surface of the Chalk Downs is in marked contrast to the angular surfaces and abrupt outcrops of other formations. The only differences in the rates of denudation which can be identified in the Chalk is shown, broadly, from the fact that whereas at the foot of the Downs the rise is fairly rapid, yet the tops of the heights are scarped back at a greater angle, apparently betokening a less power in the Upper Chalk to resist denudation than in the Lower, where there is a greater mixture of argillaceous impurities.

The scenery of the Chalk is one of gentle, undulating, rounded heights; now rising rapidly, but never abruptly, except at its escarpment. Where, as along the escarpment of the South Downs, there are comparatively extensive tablelands, the surface bears little or no relation to the planes of stratification, the levelling having evidently taken place subsequently to the folding of the south of England. Intersecting the higher grounds, are numerous valleys, winding and intersecting in all directions, and betokening most certainly the action of running water, where now the valleys are seldom anything but dry.

It is noteworthy that these valleys, which when filled with running streams, must have left the higher grounds above the water in the form of a number of islands, never terminate towards the plain or valleys, but always rise to meet the escarpment. In whatever manner therefore they have been excavated, their drainage must apparently have been towards the sea. From this I am inclined to believe that the excavation of the valleys is attributable chiefly to marine action during the process of its elevation by the sea, being a terminating period in that which resulted in the marine denudation of the surface of the higher Chalk, and its former overlying Tertiaries. The marine origin of these valleys is supported by Professor Seeley (Q.J.G.S.), although strongly opposed by other eminent geologists.

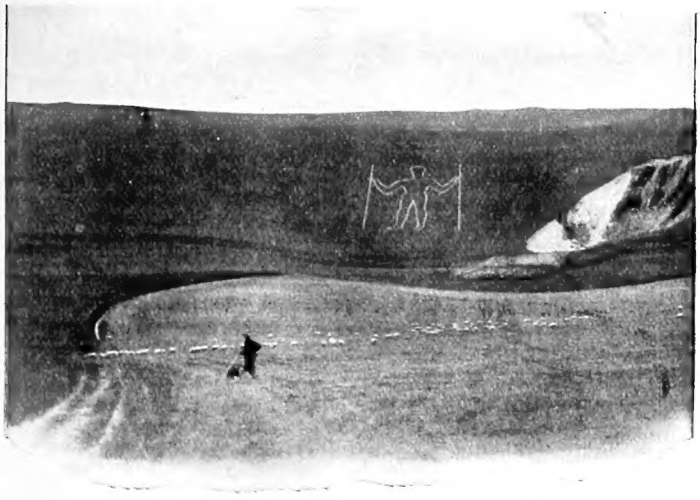
In England, from Beer Head, in Devonshire, the formation extends in an eastern direction for 200 miles, its western extension, however, consisting of a series of outliers resting upon the greensand, beyond which the Chalk is absent. Probably, where we find it further west, as in Antrim, this remnant has escaped denudation through being covered and protected by its mantle of volcanic rock.

According to Dr. J. Mitchell, the most abundant deleterious gas in the Chalk is the carbonic acid, but it seems to exist in greater quantities in the lower parts of the formation than in the upper. "Fatal effects from it were noticed at Epsom, 200ft. down, and in Norbury Park, near Dorking, at a depth of 400ft." When the workmen had sunk through 140 feet of gravel and sand on Bexley Heath, and had reached to 30 feet in the Chalk, this gas rushed out with such force as to extinguish the candles by whose light they had been working. Dr. Mitchell states that occasionally sulphuretted hydrogen is disengaged from the Chalk, probably where a large amount of pyrites is contained in the Chalk. Sometimes even carburetted hydrogen is emitted, and in the making of Thames Tunnel there was sometimes sufficient gas to cause explosion when coming in contact with lights.

It is worthy of remark that the broad escarpments of the Chalk, and the distances to which they are

visible, have caused figures of various shapes to be cut out on the faces of certain hills, exhibiting the white surface of the Chalk below the turf. The White Horse, in Berkshire, is perhaps the best known of any of these, and occupies nearly an acre of ground. There is another White Horse near Westbury, in Wiltshire. George III. on horseback appears on the chalk hill facing Weymouth. These white horses are very ancient, and are supposed to be old tribal or kingdom boundary marks. That near Weymouth existed far beyond the period of George the Third's visit, his effigy being added as a commemoration. Near Cerne Abbas there is the figure of a giant, 180 feet in height. On the Chiltern range is Whiteleaf Cross, said to have been cut by the Saxons in the year 570 to commemorate their victory over the Danes. By the courtesy of the London, Brighton and South Coast Railway Company, we illustrate the Long Man of Wilmington. It is a gigantic figure cut on the grassy slope of the Northern side of the South Downs, overlooking the railway line from Lewes to Eastbourne, near the village of Wilmington. The figure is said to be over 200 feet in length.

Chalk Cliffs at Seaford, Sussex. (1)



The Long Man of Wilmington, Sussex. (1)

(1) These blocks are reproduced from the "South Coast Quarterly" by courtesy of the Editor, and the London, Brighton and South Coast Railway Company.

(To be continued.)

HYDROGRAPHY AND FISHERIES.

As a result of the Stockholm Fisheries Conference held last summer, it is expected that European fisheries will, in the near future, be conducted on a much more scientific plan than hitherto. An important staff is to be appointed, whose principal duties will be to conduct hydrographical research in the oceans and seas of the northern hemisphere. These investigations will extend to a more exact knowledge of the habits of fish, their vertical distribution in the water and the causes for different species occupying certain depths of water strata. The biological work generally, is to include the determination of the topographical and bathymetrical distribution of eggs and larvae of marine economic fishes. Special attention is to be paid to the local distribution of the post-larval stages and their local environment. Migration, the sources of food, natural enemies, and other circumstances, which affect the abundance or scarcity of fish at certain times and seasons, will be investigated. In fact, there lies a wide field for scientific research, which will directly affect the welfare of mankind. Considering the immense importance of the fisheries as a source of food supply, it is none too soon to apply trained knowledge and investigation to prevent the existing waste.

ON COLOURING OF BIRDS' EGGS.

By J. A. Wheldon.

THE interesting theory on the colouring of birds' eggs advanced by Mr. R. J. Hughes in your November issue (*ante*, p. 172), will be read with pleasure by ornithologists. Years ago, before the fascinations of botany had monopolised all my limited leisure hours, I devoted a good deal of thought to this interesting problem, although, I regret to have to confess, with no practical result. If anything, my studies of the subject left me with some leaning towards the theory of protective colouration.

In condemning this latter hypothesis, I think Mr. Hughes is rather unfortunate in the instances he adduces of the hedge-sparrow and the thrush. Presuming that the enemy they have to guard against would most likely be a feathered one, who would look down upon the nest through a leafy screen; it is not difficult to imagine that eggs of a blue or greenish tint would most easily escape detection. The point raised with regard to the hen bird, and not the eggs, requiring protection in colouration, also seems to me unconvincing. As birds do not sit closely until the full complement of eggs is laid, it is as necessary for the eggs to be protectively coloured as for the mother bird.

Whilst I admire the ingenuity of Mr. Hughes' main postulate, I fear the proofs advanced do not warrant its full acceptation. I fully grant one of the author's contentions, that the plumage of a bird may be influenced to a small extent by the nature of its food. Such is matter of common observation in cayenne-pepper fed canaries, hempseed-fed bullfinches, and fowls fed on highly-spiced food, the basis of which is often carbonate of iron and cayenne pepper. Similar variations of tint have been noticed in the insect world by breeders of lepidoptera. Yet, in all these instances, no fresh colouration is introduced, the result being only to deepen and intensify colours already existing. It would be difficult to prove that the acquirement of dark colours by birds of nocturnal or crepuscular habits tended to diminish the supply of pigment to the eggs. In the swallow tribe, the nightjar, with much less white about it than the swallows and martins, lays the most deeply-pigmented egg of any of our British species.

Can birds be divided into the five classes proposed by Mr. Hughes? I fear not, without a most embarrassing number of exceptions. In endeavouring to so divide them, I should be inclined to include the hedge-sparrow in the first class. Why should the eggs of this bird and the robin differ so widely in colour, when their food is apparently similar? Is there not a wide difference between the cold neutral tints of those of the wagtail, the rich warm tones exhibited by the tree pipit and grasshopper warbler, and the pure white egg of the black redstart? Presumably the swallows, as insectivorous birds, are included in this section. Amongst these the food is probably less heterogeneous than in any of the species mentioned by Mr. Hughes, yet we have represented, eggs of three distinct types—plain white, red spotted, and grey marbled.

In class 2, I suppose, would be included, with the domestic fowl, the pheasant and its allies. How does Mr. Hughes account for a pen of poultry or pheasants, all fed alike, producing, the former both white and dark brown eggs, and the latter both pale greenish-stone-coloured and rich brown-stone-coloured eggs? The colour here is evidently not due to the nature of the food. Parrots fed entirely on seed lay white eggs, as do doves and pigeons, and the canary of confinement, which rarely or never gets insect food, has eggs very closely resembling some of those in class 1, whilst the linnet and greenfinch frequently lay eggs that have feeble evidences of blue or green in their ground colour.

The author very frankly admits his difficulty in bringing into agreement the diverse features presented by the eggs he places under class 3. Here again it appears to be an impossible feat to "put all the eggs in one basket." The gannets are a conspicuous exception to the other fish-eating species of section (a), for they contrive to lay an almost colourless, unblotched egg, without apparently requiring much dark pigment to adorn their plumage. Probably all guillemots feed alike, yet, on looking over my specimens, I find their eggs varying in ground colour from white to the deepest green, and the markings from none at all to the most intense brown blotching.

Under classes 4 and 5 I think it is impossible, on a dietary basis, to separate the owls from some of the hawks. Perhaps the barn owl and the kestrel will serve for the purpose of contrast. I think it can be assumed that their menu is practically the same. Yet the owl lays a white egg, and the kestrel's is heavily blotched, perhaps one of the most richly marked of its tribe. The owl cannot be said to absorb the egg pigment to dye its somewhat light coloured raiment, for the kestrel, with its deeper tinted egg, wears a much more intensely coloured dress.

I hope Mr. Hughes will accept these criticisms in the friendly spirit with which I write them; I am actuated by a desire for further information on a subject which has long interested me, and I shall be very glad if he can throw more light on the points I have endeavoured to raise. I agree with him that the subject affords an excellent field for future work, and as he has had the courage to embark on a novel course of investigation, I trust his efforts will be eventually rewarded by the discovery of some clue to what I consider one of Nature's inexplicable secrets.
—*H. M. Prison, Liverpool.*

RADIOGRAPHY.

By James Quick.

(Continued from page 169.)

Contact Breakers.

SINCE the advent of Röntgen Ray work, considerable attention has been paid to the form of the contact breaker for the coil, the results obtained amply justifying such investigation. As X-Ray work proceeded and the size of induction coils was continually being increased, it was found that the original spring form of break, as was shown upon the coil in fig. 4 (*ante*, p. 167), became unsatisfactory. The platinum contacts wear irregularly, especially when heavy currents are sent through the coil. This entails constantly filing up the contact surfaces and also adjustment of the break. The noise made by the spring also irritates the patient.

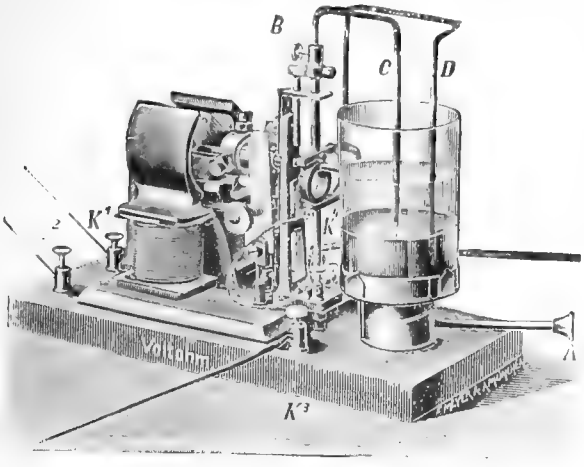


Fig. 7. Motor Mercury Interruptor.(1)

The two chief forms now being used in the larger X-Ray work are the mercury break and the recently introduced electrolytic break. In most mercury breaks contact is made and broken by means of a vertical metal rod, moving above and below the surface of some mercury contained in a vessel. An example of this kind is seen in fig. 7. The rod C is actuated by an electromotor and is connected to it by a reciprocating motion to obtain its vertical oscillations. The motor may be wound so as to be driven by the current supplied to the primary of the induction coil, in which case it is connected in the same circuit, or by a separate battery. The latter is perhaps to be preferred, as the speed of the motor may more easily be varied by altering the resistance in circuit, and this without affecting the current through the primary. In fig. 7, B is the motor, K_1 K_2 the terminals of the same, K_3 K_4 the two break terminals, one connected to the oscillating rod C, and the other to the mercury vessel D, while A is a cam arrangement for varying the height of the surface of the mercury, and thus altering the relative duration of the make and break. Great care must be taken in this form of break that the oscillating rod works quite vertically, otherwise

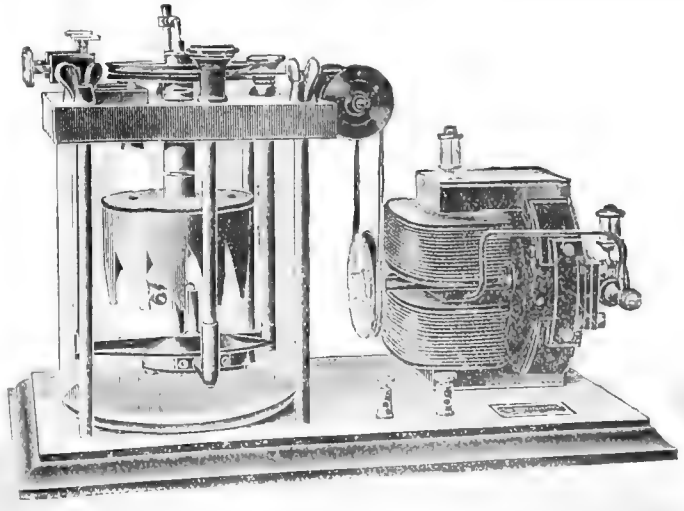


Fig. . Levy's Mercury Jet Interruptor.(2)

(1) I am indebted to the kindness of Messrs. Isenthal Potzler for the loan of figs. 7 and 8

the spark at break is elongated and the time of break lengthened.

Figure 8 shows a more recent modification due to Dr. Max Levy. The connections are the same as above, but both contacts are movable.

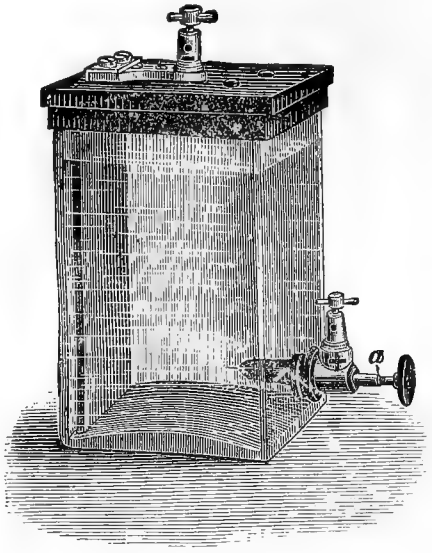


Fig. 9. Wehnelt's Electrolytic Interruptor.

As will be seen from the figure, the solid contact takes the form of a number of triangular strips of metal fixed on the edge of a disc, which rotates about a vertical axis. The liquid contact consists of a jet of mercury forced by means of a self-contained pump through a horizontal nozzle and playing upon the metal strips. These latter are all in contact with one terminal of the break, and the mercury with the other. It will easily be seen that when the disc carrying the strips is rotated by means of the attached motor, contact will be made when any one strip comes into the line of play of the mercury jet and will be broken as soon as it passes. The number of nterruptions may not only be varied by the speed of the motor, but also by altering the number of strips fixed on the discs, these being easily screwed on and off. The relative times of make and break may also be varied by raising or lowering the jet of mercury, thus increasing or decreasing the duration of contact. For it will be seen that if the jet is raised, a greater surface of the strips comes into its path, thus giving a relatively less time for non-contact. All these adjustments are very useful, since different conditions are required to be fulfilled for photographic work, to those for fluorescent screen work. Another advantage this break possesses is due to the fact that the pump, producing the mercury jet, ceases acting immediately the motor stops. When, therefore, the latter is not running, there is no danger of the main current short-circuiting direct through the primary coil.

Undoubtedly an achievement was made this year in the introduction, by Dr. Wehnelt, of the second kind of break—the electrolytic form, which is shown in fig. 9. Attention has already been called, in May last, to this break, in the Physics column of Science Gossip. It is constructed somewhat like an ordinary electrolytic cell, having two electrodes placed in dilute sulphuric acid in a suitable vessel. The cathode consists of a sheet of lead about 17×12 cms., the anode taking the form of a platinum point, arranged horizontally opposite the cathode, and at a mean distance of about 3·5 cms. from it. The sulphuric acid is made up of one part of strong acid by volume to about seven parts of water. The anode can be moved nearer to or farther from the cathode, so as to adapt the working of the break to varying conditions, and to give different results upon the coil as required. In so adjusting the platinum wire it is moved in and out of an ebonite sheath. Originally it was sealed into a glass tube. It was, however, found that the latter was apt to break, owing probably to the great heat and to the expansion at the discharge point; for when the instrument is working, the liquid round the anode is vaporised and the point becomes red hot. In fact, there is a kind of spheroidal condition kept up, and it is here that by far the greater part of the resistance of the break occurs.

The theory of the action of this instrument is still under discussion, for although it is termed an electrolytic break, it is by no means certain that electrolysis does take place. In fact, a recent communication to "Wiedemann's Annalen" by H. T. Simon, points to the action being entirely attributable to heat; and that it may be explained at least partly by Joule's law of the heating effects of an electric current. More will be said later upon the manipulation of Wehnelt's

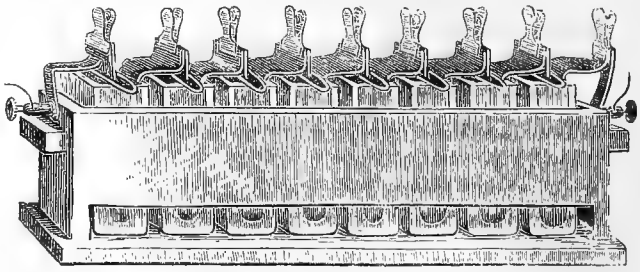


Fig. 10. Set of 8 Grove Cells.

Fig. 10a. Zinc of Grove Cell.

form, when we consider different sources of current.

Since this break was first brought out there have appeared modifications of it by E. W. Caldwell, A. A. C. Swinton, and others. In Swinton's form, the platinum anode is replaced by a second lead sheet, smaller than the cathode, and separated from it by being placed vertically in a large thick test tube.

This tube has a small hole about 3 to 4 mm. diameter at the bottom, the interruptions taking place at this hole, and not at the anode, as before. The adjustment is made by raising or lowering a vertical glass

Fig. 11. Bunsen Cell. Round Form.

rod, whose drawn out lower end works in or out of the hole and so alters its effective diameter. It is claimed for this break that the fatigue observed in the Wehnelt form, is to a certain extent avoided.

Sources of Current.

As may be easily understood, the strength of current employed is entirely dependent upon the size of the induction coil. Three sources of current are obtainable: (1) primary batteries, (2) secondary batteries or accumulators, (3) electric lighting circuits. Which of these three is employed will depend upon the size of the coil, and upon the locality in which the work is to be carried out. Each is most useful under certain conditions. For instance, the last two are barred to a worker in India or the Colonies: or even in some parts of England, where a central lighting station is not within his reach. On the other hand, to one having an electric lighting installation in his house, these two last sources will prove the least troublesome and at the same time the most economical. These three sources we shall now consider.

Primary Cells.

The two chief objections to primary batteries for this work are, that they entail a considerable amount of trouble to set up every time they are used, and that most of them give rise to irritating fumes. X-Ray work sometimes lasts for half-an-hour to an hour without much interruption, and it is necessary that the battery should give a constant current during that time. Generally speaking, however, it is those primary batteries emitting objectionable fumes that are most constant. The three chief forms in use are the Grove, the Bunsen, and the Bichromate batteries. These are depicted in figs. 10, 10*a*, 11, 11*a*, and 12 respectively.

The Grove cell consists of a plate of zinc bent into a U form, fig. 11*a*, placed in a rectangular porcelain pot, a porous pot lying in the bend of the zinc, and a piece of sheet platinum placed inside the porous pot. The outer pot is filled with dilute sulphuric acid of strength equal to one part of acid by volume to nine parts of water, the inner pot with strong nitric acid. The current emerges from the cell at the platinum electrode. Figure 10 shows eight of these cells, coupled up in series; that is to say, a platinum of one cell connected to a zinc of the next, and so on. The electromotive force (E.M.F.) of a Grove cell is about 1.9 volt, and the current obtained is constant for a fairly lengthened period. When the cell is working, however, the nitric acid is reduced, and it is the resulting nitrous fumes that are objectionable.

The Bunsen cell is of similar construction to the Grove pattern, excepting that a carbon plate is substituted for the very expensive platinum one: the

Fig. 11*a*. Bunsen Cell—Flat Form.

action being the same. Figure 11 shows the round form and fig. 11*a* the flat form of this cell. The E.M.F. is about the same as that of the Grove, and the cell is a constant current one, but nitrous fumes are also produced.

A less objectionable, but at the same time a useful type, is the Bichromate cell. The electrodes are

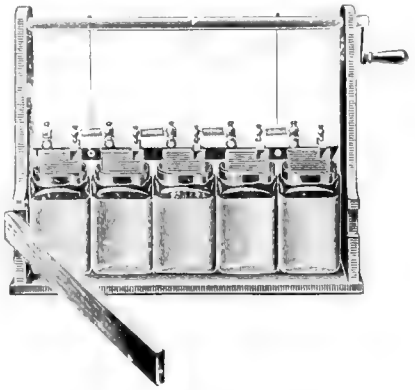


Fig. 12. Bichromate Battery.

carbon and zinc plates. These are placed in a solution of chromic acid or in one of strong sulphuric acid and potassium bichromate, strength about one part of acid to five of bichromate, by volume. Figure 12 shows a set of five of these cells coupled up

in series and fitted into a frame provided with a lifting arrangement, whereby the plates are raised out of the liquid when the battery is not required. The Bichromate cell entails less trouble than, but is not so constant as, either of the preceding forms. Its E.M.F. is about 1.9 volt.

Not more than four of any of the above cells, connected in series, should be necessary for a properly-onstructed induction coil giving a normal spark of

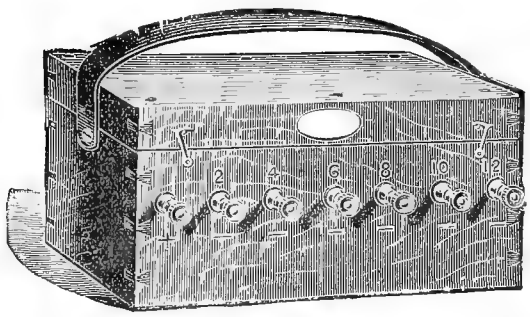


Fig. 13. Secondary Battery—Portable Form.

three to four inches, while six cells should be sufficient for a six or eight inch spark. For coils above this size, it is not very often that primary batteries are used, unless the other sources of current are not available.

Secondary Cells.

Secondary cells differ from primary ones both in construction and action. They consist of two or more lead plates, either plain or covered with lead sulphate paste according to the particular make, immersed in dilute sulphuric acid. If the two surfaces, facing each other, of any two plates are in the same condition, there is no difference of potential between them; and therefore no current is obtainable from the cell. A "charging" current, from an external source, is sent through the cell when peroxide of lead (PbO_2) is formed upon the surfaces of the plates connected to the positive terminal of the charging current, while spongy metallic lead or oxide of lead (PbO), is formed upon the others. It is in consequence of this difference in chemical condition between the plates, that an E.M.F. is set up; and that the cell is capable of producing a current when required. While the cell thus discharges itself in giving out a current, the plates return again to their original inert condition, when they will require a fresh current to recharge them. The E.M.F. of a secondary cell is about 2.2 volts, and is very constant almost throughout the whole time of discharge. The positive terminal of the cell is the one to which the positive terminal of the charging current is connected, and whenever the cell is to be recharged, care must be taken that these same connections are made, otherwise the cell will become "unformed." It should, moreover, be remembered that the E.M.F. of the charging current must not be more than 2.5 to 3 volts per cell, or the life of the latter will be considerably lessened.

The capacity of any secondary battery, that is the amount of electrical energy obtainable from it, will depend upon the size and number of the plates in each cell, and also upon the particular type of cell. This capacity is generally defined in ampère hours: that is, the number of hours the battery, when charged, is capable of producing a current of 1 ampère. For instance, a 60-ampère-hour battery will give 1 ampère for 60 hours, 2 ampères for 30 hours, 4 for 15 hours, and so forth, as far as the limit of constancy guaranteed by the maker.

Secondary batteries for X-Ray work are generally portable, as is shown in fig. 13. This particular form, as will be seen, consists of six cells, producing in all, an E.M.F. of about 13 volts. Its usefulness is much increased by having an additional terminal connected to each cell, so that intermediate values of E.M.F. may be used, if required. Such a battery, if say of 45 ampère-hours capacity, measures about 18×8×8 inches and weighs about 50lbs.

Before leaving the question of secondary batteries one important point must be mentioned. When a battery has just been fully charged its rate of discharge is much above the normal, and great care should be taken when connecting it direct to an induction coil, lest the latter becomes damaged by the heavy current. A resistance should be inserted for safety, and which can be cut out again when the discharge rate is normal. As the smaller induction coils, from 3 to 6in. spark, require only about 6 to 8 volts to work them, 3 or 4 secondary cells would be ample. For larger coils the necessary E.M.F. increases up to 16 volts or more.

(To be continued.)

Camara Pertana.—Dr. Pertana, chief of the Bacteriological Institute at Lisbon, has fallen a victim to the plague, while studying its ravages at Oporto. He was a most ardent and accomplished bacteriologist, though his works being written in Portuguese, are not much known. It was his verdict on specimens sent to him from Oporto, that established the existence of plague in that city. At this time, when every worker investigating this bacillus is so urgently needed, Dr. Pertana's death is the more to be deplored.

To Find due South.—The "Photogram" publication is issuing some cards useful to amateur photographers and others. One before us shows how to find due South without a compass. Hold an ordinary watch horizontally, so that the hour hand points to the sun. The position half-way between that point and the XII (12 o'clock) point of the watch, is due South. Thus: at 4 p.m., when the hour hand points to the sun, the dial point II (or 2 p.m.) is due South. Or, at 6 a.m., if the hour hand points to the sun, the dial point IX (or 9 a.m.) is due South. Count forward in the morning, backward in the afternoon. Facing the South, East is always three hours earlier; West is three hours later. North is the opposite side of the dial. The rule is based on the fact that the hour hand makes two complete circuits of the dial, while the sun is making one apparent circle round the earth.

DEPARTMENTAL SNUBBING OF SCIENCE.

WE have pleasure in quoting the following paragraph extracted from "Nature" of 9th November, as its sentiments have our cordial approval. It must be remembered that it is the result of departmental administration, and not the instructions of Cabinet Ministers: –

"Certainly not for many years has there been so much anxiety, either expressed or silently borne, as since some days ago, when the wire joining Ladysmith and civilisation was broken. Not only have the relatives of the 10,000 Britons beleaguered there been anxious, but all who take interest in the severe struggle which is now going on. It has been a matter of general surprise that in a campaign in which the cutting of telegraph wires was the first thing to be expected, and the investment of several isolated garrisons for a time was to be taken for granted, Marconi apparatus was not installed as a matter of course. We do not share this surprise; science, and especially the latest developments of science, are the last things to interest our Government and the Government Departments; they do not believe in science, they care to know very little about it, and the scientific spirit is absent from too many of their plans and doings. Hence we have now to be thankful that they have reached the level of the pigeon post, which has been the only official means, and that on the part of one or two birds, to keep us in touch with our beleaguered forces. It is stated that even the Commander-in-Chief, Lord Wolseley, has expressed some surprise that the so-called "Intelligence Department" of the Army allowed the Ladysmith force to go to the front with mountain guns against a Boer force which they should have known might be armed with Schneider-Canet cannons of large calibre; and it would seem that probably a terrible disaster has been prevented, not by our Intelligence Department, not by the outfit of our Army, but by the apparently accidental arrival of naval guns and *personnel* at the last moment. Why is there not a Scientific Committee to do what it can in advising the military authorities? If they could do nothing, nobody would be the worse, but they might be able to do much to the nation's advantage."

This snubbing of science extends in other directions. Unlike the nations that are rapidly outrunning Britain in everything, from education to commerce; the departmental administrations of what should be the great centres for the encouragement of science in Britain, are positively stingy in circulating printed matter expounding the results which the large expenditure granted by the Nation leads us to expect. As an example of what we mean, we append a recently received letter from the Director of the Geological Survey, which expends an annual grant of over £8,000.

"Geological Survey Office,
"28, Jermyn Street,
"London, S.W.

"23*rd September*, 1899.

"SIR,—I am desired by the Director-General to acknowledge the receipt of your letter of the 18th inst., and to forward to you a copy of the 'Summary of Progress' for 1898.

"While anxious to afford every assistance to scientific literature, he much regrets that—owing to our stock of presentation memoirs being so limited—he is unable to comply with your request for review copies.

"I am, Sir,
"Your obedient servant,
"(Signed) HORACE B. WOODWARD.

"John T. Carrington, Esq.,
"*Editor* 'SCIENCE-GOSSIP.'"

This is not the only case. If we want a copy of the Kew Bulletin we have to purchase it. A letter of similar tenor was sent to us from the Director of the Royal Gardens, Kew, in reply to our application to be placed on the list for the distribution of that magazine, issued by the Government; we may, however, except the Department of Agriculture.

This gives us an opportunity of explaining to our ten thousand readers who extend to every portion of the civilised world, why, though SCIENCE-GOSSIP has been established about thirty-five years, and is the only English scientific magazine having independent offices we so rarely mention scientific publications issued by the English Government Departments, and so frequently the like publications of foreign nations. All of these latter regularly send their literature, but the Departments at home—"well, hardly ever."

GRANT ALLEN.—The death was recently announced, to the sorrow of all who knew him, of this well-known novelist and popular science writer. Though better known in his former capacity, Mr. Grant Allen commenced his literary career as writer of popular scientific articles. He has done much to render the dry facts of science interesting to those who would probably never take the trouble to wade through the books in which the original workers recorded their researches. His exposition of the Darwinian theory was so clear, that he has sometimes been called the "Darwinian St. Paul." Among his better-known works are "The Evolutionist at Large," "Physiological Aesthetics," "The Colour Sense," "Flowers and their Pedigree," "The Evolution of the Idea of God," "Science in Arcady," and many others. He was a Canadian, having been born at Kingston, Ontario. We would remind our readers that at the time of his death a pleasing series of articles by him, on "Insect Life" were appearing in the "Strand Magazine"; illustrated by Mr. Fred Enock.

STEEL BOOKSHELVES.—We have added to the office of SCIENCE GOSSIP a useful piece of furniture in the form of a stack of patent book-shelving, constructed of steel. It stands 7ft. 6in. in height, by 3ft. 6in. wide. We mention this convenient arrangement on account of its novelty, and light appearance. There are only two uprights, formed of light steel, which carry eight adjustable shelves. These are fixed by ingenious lever arrangements that act with clutches. The principle allows the brackets carrying the shelf to be raised without touching the clutch, and they drop into position on being released. To lower the shelf, it is only necessary to place one's finger on the lever of the clutch until in the required position; when released the clutch acts automatically. Thus the shelves can be arranged to the fraction of an inch at pleasure. The whole of the metal work is electroplated a dark copper colour, and so is not liable to rust. These patent shelves are supplied by the Library Bureau, Ltd., 10, Bloomsbury Street, London, W.C.

BUTTERFLIES OF THE PALAEARCTIC REGION.

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

(Continued from page 171.)

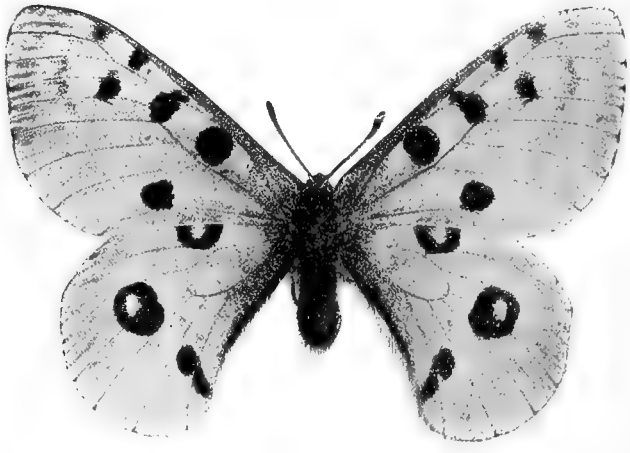
IN describing the species of the genus *Parnassius*, which generally very much resemble one another, we have to bear in mind the following markings; F.w. Deep black spots near costa from 2 to 5. The 2 or 3 outer ones placed one above the other and often marked with red. Another spot near centre of inner margin also frequently marked with red. A marginal transparent band and another shorter one, internal to this, generally wavy and reaching from the costa. H.w. Two large spots usually bright red, and surrounded by black rings, often with white centres, black basal and inner marginal patch of shading. Marginal and ante-marginal transparent bands. A black spot near anal angle. Underside h.w. with red patches at the base.

♀ larger and duskier in appearance than ♂; spots near anal ang. h.w. with one or two red centres.

Hab. Hilly and mountainous regions throughout Europe, except the Polar regions and the British Isles, from which it is absent. Armenia and S.W. Siberia. Nearly always a common species where it occurs. I found it the most common butterfly at St. Martin Vesubie in the French Department of Alpes Maritimes in June, 1899. V.—IX.

Larva. Black covered with reddish orange points and small blue elevations. There is a post-cephalic Y-shaped process. On Saxifrages and *Sedum*. IV. V.

a. var. *hesebolus* Nord. 80—95 mm. Resembles *P. apollo*, but is much larger. Wings whiter in



Parnassius apollo var. hesebolus.

These are the most frequent characters; but occasionally one or other of them, or rarely all of them, are absent. Sometimes extra markings are added, such as a red spot at base of h.w., or a row of blue centred ante-marginal spots.

Group I. carinati Aust.

1. **P. apollo** L. Lg. B.E. p 6, pl. IV, fig. 1, pl. V., fig. 6. Aust. Parn. 86, pl. VII., fig. 1. Abdominal Pouch Fig. 1*a*, 1*b*.

76—80 mm.

Wings white, more or less translucent; F.w. with out. marg. broadly shaded with a transparent border, internal to which is a wavy band. Costa with four black spots: in. marg. with a conspicuous black spot at centre. H.w. with two circular red spots, surrounded by black rings and often with white centres, one spot is near the costa, and the other central. In. marg. black. No red basal spot. U.s. h.w. with red basal spots. Margl. fringes not chequered.

appearance, and not so translucent. F.w. with the ant-marg. transparent, bands very much less in proportion. ♀ with the in. margl. and one of the costal spots marked with red as in *P. delius*. H.w. in ♂ much less broadly black at base and inner marg.; ou. marg. white with no dusky band. Black spots towards an. ang. strongly marked.

Hab. Siberia, Altai and Ala-Tau mountains; Ural, Caucasus. The largest specimens are found in Thibet. V. VIII.

b. var. *mongolica* Stgr. Much resembles *hesebolus*, but the base and inner margins of h.w. are blacker and more strongly marked. The wavy ant. marg. band of all the wings are more indicated. Hab. Tianschan.

c. var. *transbaicalensis* Stgr. About the size of *hesebolus*, which it much resembles, but all the spots are smaller, especially those marked red on the h.w. Bases of h.w. blacker, but the black spots near

an. ang are wanting, or inconspicuous in ♂. Hab. Transbaical (Kentei).

d. ab. ? An ab. of *apollo* occurs in the Sierra Nevada and other Spanish mountains, with orange spots in place of red. It does not appear to have received a name.

2. **P. nomion,** Fisch-Aust. Parn. p. 91. Pl. XII. 2.

65—79 mm.

Somewhat larger than *P. apollo* and more strongly

P. nomion.

marked. F.w. more rounded, marginal fringes chequered with black. In. margl. spot indistinctly pupilled with red. H.w. with the basal and in. margl. shading intense and sharply defined, extended outwards so as to almost embrace the disc. cell.; ou. marg. with a row of square dark spots; the base is marked with more or less distinct small red spots; which are never seen in *P. apollo.* The red spots are large and round, and rarely with white centres.

♀ with a slightly ochreous tinge in the white ground-colour of the wings, sometimes the spot near an. angl. h.w. is marked with red. Abdominal pouch larger and more expanded than in *P. apollo.*

Hab. Its area of distribution begins in the mountains of Irkutsck and Kiathtka in Siberia, thence it passes on to the territory situated to the north of lake Baikal in the neighbourhood of the Ussuri. It is found very frequently in all the Alpine regions which are watered by the Amour. It is probable that it descends to the Alps of N. China. On the American Continent it is found in Alaska and California. (Austat, 1889.) In the Altiai 2,000 feet to 5,500 feet. Bashkaus and Tchulishman valleys to the S. end of Lake Telestskoi. (Elwes, Tr. Ent. Soc. Pt. III. 1899.) VII.

Larva. Undescribed.

a. var. *nomius* Grum, R. and H. pp. 100, 704. 55—60 mm. A smaller and less intensely marked form. Hab. Koko Noor in Central Asia.

b. Var. *nominulus* Stgr. 51—61 mm. Smaller and darker than type. ♀ especially strongly marked and dusky in appearance. F.w. powdered with black scales, h.w. usual markings very black. Hab. Transbaical.

P. mercurius, Grum. R.H., p. 98 (*P. epapha* Oberth var. *mercurius*).

50—60 mm.

Much resembles the smaller vars. of *P. nomion.* Wings in ♂ with the ground colour pure white, the spots placed as in the last species, but very small, especially the red centred spots of h.w. In. margl. patch much as in *P. nomion.*

♀ has the greater part of wings semi-transparent and dusky looking. F.w. white in the subcostal and discoidal area, the two outer costal and the in. margl. spots are marked with red. H.w. white in the central area and costal. Fringes slightly chequered with black. Abdominal pouch smaller and proportionally narrower than in *P. nomion.*

Hab. Central Asia, Koko Noor, Amden and Sinin mountains.

I have received a pair of this species and also of *P. nomion* var. *nominulus* from Dr. Staudinger.

4. **P. delius,** Esp. (*phoebus* Prun.), Lg. B.E., p. 17, pl. IV., fig 2; Ka. E.B. Pl. I. fig. 2.

60—70 mm.

Bears a superficial resemblance to *P. apollo,* to which, however, it is less closely allied than is *P. nomion.* In size it is somewhat smaller, the ground colour is more tinged with yellow, and the wings are less transparent. The wings are more elongate and less rounded in outline.

♂ F.w. with four black spots near the costa, the outer ones with one or two small red centres. The transparent marginal band is less extended, and the

P. romanovi.

ante-marginal band smaller and more broken. The inner marginal spot is inconspicuous and often absent. H.w. plain white, without any trace of marginal bands. There is a small red basal spot never seen in *P. apollo.* Inner marginal black markings much less extensive than in *P. apollo,* and there are no black spots near anal angle. ♀ larger

than ♂. F.w. very much like those of *P. apollo* ♀, but the outer costal spots have from one to three red centres. The inner marginal spot is conspicuous and often marked with red. H.w. as in ♂, but with a marginal transparent band. Black spots at anal angle often marked with red, generally a red basal spot. The two large red annular spots have sometimes a faint trace of a black connecting line. Abdominal pouch a little larger than in *P. apollo*.

HAB., the Alps of Switzerland, France and Austria, also the Caucasus. VI.—VII.

It frequents much more elevated situations than *P. apollo*, and is less common.

LARVA resembles that of *P. apollo* in size. The colour is black, spotted with lemon-yellow, the head and prolegs are dull black, and the legs shiny black (Zeller).

PUPA resembles that of *P. apollo*. Found under stones. Food plant *Saxifraga aizoides* and *Sempervivum montanum*. VI.

a. var. *intermedius* Mén. Aust. Parn. pl. XI., fig. 3, pl. XII., 1. 3.

50—55 mm. A small Asiatic variety of *P. delius*. The wings are purer white in colour, and the markings are smaller; especially the red centred spots. The marginal transparent bands are much narrower than in the type. F. w. with a distinct inner marginal spot. ♀. Less dusky than in type. The inner marginal spot is more liable to be distinctly centred with red. The abdominal pouch is broader. HAB., South Siberia, Kamtschatka, Turkestan.

The North American var. *smintheus* Doub. with its dark ab. *hermodur* Edw. greatly resembles the var. *intermedius*, it inhabits the Rocky Mountains and Colorado.

b. var. *sedakovii* Mén, Aust. Parn. pl. IX., fig. 3. Smaller than var. *intermedius*. Somewhat more densely scaled, and with less extended transparent markings. The costal spots f. w. are reduced to two, and the central spot of h. w. to a black dot without any red centre. HAB., Irkutsk, E. Siberia.

c. var. *corybas*. F. de W., Ent. II., pl. VI., 1, 2. (1823). This var. appears in Fischer's Entomographie de la Russie, and is figured as a rather large and dark form of *P. delius*. Wings duskier than in type. F.w. with five red spots. H. w. with three red ocelli and red basal spots. HAB., N.E. Siberia at an elevation of about 6,000ft., Kamtschatka.

5. **P. actius** Ev.

52—54 mm.

Smaller, and much whiter than *P. apollo*. All the usual spots on f. w. are well marked. The two outer costal spots are often strongly marked with red, but not the inner marginal one. Transparent marginal band, narrow but extending nearly the whole length of the margin. H. w. with the black inner marginal patch well defined, but not so extensive as in *P. nomion*. Red centred spots at costa and centre well defined, but none near anal angle. There is a more or less defined row of ante-marginal black spots, inclined to be triangular or chevron-shaped. Outer margins chequered as in *P. nomion*.

♀ resembles ♂, but somewhat darker.

HAB. A widely distributed species. It was first discovered in 1842, by M. Schrenck, on the elevated mountains in the neighbourhood of Tarbagtai; but has since been found throughout the whole of Turkestan, and on all the Alps of Songaria, as far as the beginning of the Altai Mountains (Aust.) It occurs at great elevations and in dry places, where saxifrage grows.

6. **P. actinobolus** Stgr. in litt.

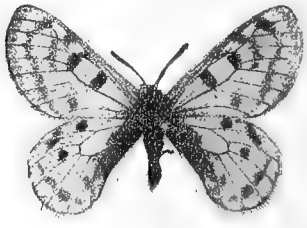
A ♂ example of this new species received from Dr. Staudinger 1898 greatly resembles *P. actius* in size and appearance, but in the f.w. the ante-marginal wavy band is very nearly absent. H.w. without the ante-marginal row of triangular spots, but with a narrow black undefined marginal band. *u.s.* with red basal spots larger and brighter red than in *P. actius*. Margins less chequered than in that species.

HAB., Tianschan, Songaria.

7. **P. olympius** Stgr. Deutsche Ent. Zeitschr, p. 344, Lep. n.sp. 1897.

67-75 mm.

Resembles a large *P. actius*. Ground colour of wings very white. F.w. with all the spots well defined, two costal and inner marginal spots with small red centres. Outer marginal transparent band, h.w. well marked, with inner marginal shading much less black than in *P. actius*. With two black spots



P. simonius.

without red centres near anal angle. Red spots very large and bright in colour. Triangular ante-marginal spots well defined. *u.s.* Ground colour chalky white. All the spots and markings well defined.

The above description is from a single ♂ of this large and magnificent species, which I received from Dr. Staudinger 1898.

HAB., Tianschan.

8. **P. discobolus** Alpheraky.—(*P. corybas* var. *discobolus*) 1881. Stgr Berl. Ent. Zeit. 1882. (? Corybas F. de W.). Aust. Parn. Pl. VII., fig. 2. Pl. VIII., fig. 3 ♀ (*discobolus*). Abdominal Pouch, figs. 2a, 2b.

68—73 mm.

This species, which certainly belongs to the *apollo* group of Carinati, is distinguished by the decidedly yellowish or buff tinge of the ground colour, and by the dusky appearance of the wings, due to the presence over most of their area of black scales.

Added to this, the hind wings are more pilose at the bases than in the foregoing species; a denser and less transparent texture being the result. The markings are arranged almost exactly as in *P. apollo*, but the f.w. have the two outermost of the four costal spots marked with red, as well as that near the inner margin. H.w. with the red spots larger, and lighter red than in *P. apollo*, and without white centres, a well marked ante-marginal row of triangular spots. Spots near anal angle sometimes marked with red, but only faintly so.

♀ Usually larger, duskier, more transparent than ♂. Abdominal pouch differs from that of *P. apollo*, as will be seen in the figure, especially in its anterior part (*ante*, p. 171).

Hab., Altai, Tianschan, Alps of Kokand. At an elevation of about 4,000 to 6,000ft. V.—VIII.

This species when first discovered was thought to be identical with var. *corybas* of Fischer de Waldeim, 1823. It is, however, perfectly distinct from that form, which has its habitat in North-Eastern Siberia.

a. ab. ♀ *nigricans* Stgr. Aust. Parn. pl. VIII. fig. 3. A very dusky melanic form of ♀ taken in Tianschan by Alpheraky with the type, but not reaching such great elevations.

b. var. *minor* Stgr. Aust. Parn. pl. VIII., figs. 1, 2. A small and darker form, and less transparent than type. H. w. with the inner marginal patch more intense and extended, hiding the spots near anal angle. Red spots smaller than in type, and sometimes centred with white.

Hab. Ala Tau (Songaria). Hazereth, Province of Samarkand. Found with the type in these two separate districts of Central Asia. Said not to occur at the higher elevations.

(To be continued.)

BRITISH FRESHWATER MITES.

By Charles D. Soar, F.R.M.S.

(Continued from page 178).

2. *Hydrochoreutes krameri* Piersig, 1895.

I DO not think this water mite requires any particular description. It can easily be

Fig. 9. *H. krameri*, Petiolus.

recognised from *H. ungulatus* by its petiolus (fig. 9). It is a much rarer mite than the other.

Male.—The male is a little smaller than the male *H. ungulatus*.

Localities.—During my experience I have only seen two specimens, both males. One was sent by Dr. George from Lincolnshire, and one I found in Surrey. I have not yet had a fully-developed female of this species, only one or two young ones, and a few nymphs.

GENUS *BRACHYPODA* LEBERT, 1875.

The characteristics of this genus are:—Body chitinous, with a granulated surface, and a depressed line running round margin of female. Legs short, not very hairy, but adapted for swimming. All tarsi have claws. Epimera forms one group. Palpi spoon-shaped on fourth segment. Eyes widely separated and near margin of body. Three discs on each genital plate.

Brachypoda versicolor Muller, 1776.

Male. -Body: A long oval, slightly truncated on the anterior margin. Length about 0·64 mm. Width about 0·44 mm., dorso-ventrally rather flat, particularly in the posterior portion. Colour a straw

Fig. 1. *B. versicolor.* Ventral surface of Male

yellow, with green, red and white patches on the dorsal surface, which in some specimens are very brilliant. On the anterior margin of the dorsal sur-

Fig. 2. *B. versicolor.* Ventral surface of Female.

face is a depressed line, which extends backwards about one-third of the body.

Legs.—A pale straw colour. Length of first pair about 0·40 mm.; fourth pair about 0·53 mm. On the fourth segment of the last pair of legs is a strong spur, very similar to those we find on the male Arrenuri. This was one reason why Koch, in his work, placed this species in genus *Arrenurus*. All feet have claws.

Epimera.—Forms on group, very highly coloured, the central portion in some cases being a bright

orange, with the margin of a brilliant green.

GENITAL AREA.—Three discs on each side of the median line as shown in fig. 1.

PALPI.—About 0·22 mm. Second joint has a strong short spur. The fourth segment spoon-shaped. (Fig. 3.)

FIG. 3. *B. versicolor.* Palpus of Male.

FEMALE.—Length about 0·60 mm. Width about 0·48 mm. Is shorter and more oval than the male. It has a small notch on the posterior margin, which is a very uncommon feature in water mites. The depressed line in the female runs all round the margin, on the dorsal side of the body. Colouring same as that of male. The fourth pair of legs are without the spurs we find in the male. (Fig. 2.)

LOCALITIES.—Common everywhere. I have taken hundreds of specimens in different parts of England. Although so common, there is only one species at present known in this genus. The proportion of males to females, as far as my own collecting has gone, indicates one male to eight females.

(*To be continued.*)

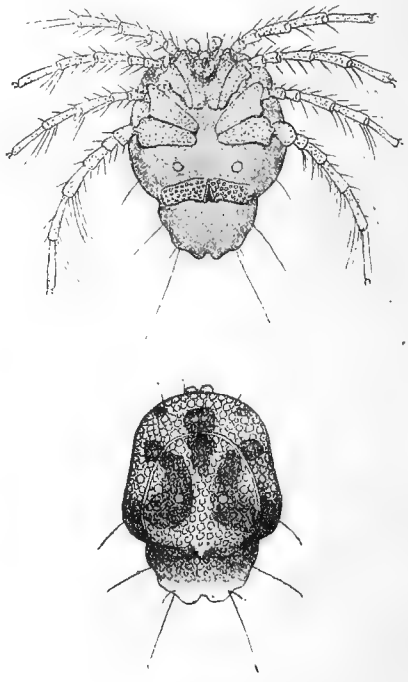
ARRENURUS INTEGRATOR Müller.

This mite is of a dark greenish blue colour, and rather small. The male is without the peculiar

Arrenurus integrator.

appendage on the penultimate internode of the fourth leg. Mr. Soar's accompanying drawing is so characteristic that it requires little description. In SCIENCE-GOSSIP for April, 1884, page 80, I described and figured a mite, which at that time I mistook for *A. integrator*. In colour and size it is very like that species, but differs in having a notch in the centre of the posterior edge of the tail, whilst in *A. integrator* that part is rounded and without a notch.

Piersig has named this mite *bifidicodulus*. Mr. Soar's figure in next column shows the difference very plainly. His measurements are :—*Arrenurus integrator*, 0·80 mm. long and 0·56 mm. broad;



A. bifidicodulus.

A. bifidicodulus, 0·88 mm. long and 0·68 mm. broad.

I have found these mites on several occasions, so that I cannot consider them rare.

Kirton-in-Lindsey. C. F. GEORGE.

GLANDULAR HAIRS OF AURICULA.—The apparently powdered appearance of the mealy variety of Auricula, furnishes an interesting microscopic object. A piece of young leaf (or flower-stalk when obtainable), should be carefully cut off, with as little disturbance of the surface as possible. It may then be placed without other preparation in the stage-forceps, or the contrivance can be used as suggested in SCIENCE-GOSSIP for May, 1899. A good light should be thrown on by the bull's-eye, and an inch or 1½in. objective used. It will be found that what appear to the unaided eye mere dusty particles, are in reality somewhat complicated objects, being in fact, multicellular hairs. They consist of three cells, a cone-shaped basal one attached by the broad end. On the apex of this there is a short cylindrical one, which is crowned by a globular head. From this latter radiate in all directions tiny glistening white rodlets or needle-like crystals, composed of a resinous substance. This must be removed before the secreting and supporting hair-like body can be examined. The application of gentle heat, as from an extinguished but still glowing match, held near, will accomplish this. The best way is to immerse the leaf in alcohol—methylated spirit will do—for a few minutes. When dry, the object should be viewed from various aspects with the light carefully directed. The structure described will then be beautifully shown, especially at the leaf margin. —*Jas. Burton, 39, Ingham Road, West Hampstead.*

BOOKS TO READ

NOTICES BY JOHN T. CARRINGTON.

Plant Diseases. By GEORGE MASSEE, F.L.S. xii. + 458 pp., 8in. × 5½in., with 91 illustrations. (London: Duckworth and Co. New York: Macmillan's, 1899.) 5s. net.

The full title of this work is "A Textbook of Plant Diseases Caused by Cryptogamic Parasites," the author being the Principal Assistant (Cryptogams), Royal Herbarium, Kew. Mr. Massee has therefore special claim to our attention, in consequence of his knowledge of cryptogamic botany, and this branch of vegetable pathology. In most instances an illustration is given of at least a portion of the afflicted plant. These are excellently drawn,

From MASSEE'S PLANT DISEASES.

FIG. 1. *Rhytisma acerinum.* 1. Sycamore leaf, with Rhytisma blotches. 2. Section through black patch bearing Spermatia ×200. 3. Ascus containing spores. 4. Free spore ×300.

FIG. 2. *Fusicladium pirinium.* 1. Fungus on upper side of pear leaf. 2. Fungus on pear. 3. Conidia × 300.

and many show much detail. We have selected a couple to illustrate their style, which are here reproduced by the courtesy of the publishers. We have intentionally chosen two familiar cases, as they will be the more interesting. The book has a useful introduction explaining the parasitic fungi and their action in producing the diseases, then follows much information on fungicides, and the best means of getting rid of these pests, from the economic point of view. It is only when attention is drawn to the fact, that one realises the immensity of the loss which can be inflicted by one of these microscopic species. Mr. Massee quotes Government statistics of the losses in Prussia of the grain harvest from depreciation by rust. It was estimated in 1891 to have reached the sum of £20,628,147 sterling, or almost a third of the total value of the crops. Other instances are given, for example, the loss in a single tomato house in Guernsey, from a plant parasite, is said to sometimes reach £200 a season. We can therefore appreciate the value of such a text-book as that before us, to those who are engaged in the culture of plants for economic purposes. In addition to the illustration, when describing a disease, the author adds preventive means, and at the end of each, a reference to other useful literature upon the subject. Considering the number of illustrations and the excellence of the literary matter this work may be considered as one of the cheapest we have met with for some time.

Life and Letters of Sir Joseph Prestwich, M.A., D.C.L., F.R.S. Written and edited by his wife. xv. + 444 pp., 9in. × 6in., with frontispiece and 23 other illustrations. (Edinburgh and London: William Blackwood and Sons, 1899). 21s.

There is a melancholy interest connected with the issue of this volume, as it forms the closing work of both husband and wife; he having died on the 23rd June, 1896, and she a couple of months ago, soon after the completion of her labours in producing this memoir of her talented husband. We all know the difficult and delicate task undertaken by any person in editing the letters and summarising the work of one departed, who was held in high esteem or affection. Lady Prestwich showed much judgment in dealing with the material left by Sir Joseph, and wisely she gave us chiefly what might be described as the personal side of the life of Professor Prestwich. Commencing with the story of his boyhood, his school days in Paris, his subsequent home life, his entry into business as a wine merchant, his numerous travels both as the commercial representative of his firm and on holiday excursions, we find from the earliest days the taste for natural science was born in him. In those beginning years, when scientific instruction was difficult to attain, for they were in the teens of the century, Prestwich seems to have been a studious lad, grasping unconsciously every opportunity of obtaining scientific information. A diary made at the age of twenty, shows him to have possessed quite an important little laboratory. One of the most pleasing features of the book before us is the reference to his introduction to, and friendship with, most of the

leading contemporary geologists. Portraits are given of a number of these, and extracts from their private letters, containing many pleasant passages, amusing to read. In fact, throughout the book Lady Prestwich exhibited a lightness of touch and a tendency to humour, which leavens what might otherwise have been easily rendered in a dry and heavy manner. This work is one which certainly should be possessed by every geologist worthy of the name. It will be found good reading for most people, as they will better understand from its perusal, the difficulties encountered by the "Fathers of Science" in the early part of this century, when bringing their respective subjects to the prominent notice that has enforced the present public recognition of the value of Natural Science studies.

North American Slime-Moulds. By THOMAS H. MACBRIDE, A.M., Ph.D. xvii. + 229 pp., 9½in. × 6½in., with frontispiece and 18 other plates (New York and London: Macmillan and Co., 1899) 10s.

This handsomely produced work forms a descriptive list of all species of myxomycetes hitherto described, from North America, including Central America. The author is Professor of Botany in the State University of Ohio, and an authority upon slime fungi. It is curious it is only comparatively recently that these odd plant forms, which are on the borderland between plant and animal life, should have received serious attention, and we find by a comprehensive bibliography in the book before us how scant is the literature of the subject, especially in the English language. This work, therefore, forms a fine addition to the list. One of the most useful features of Dr. Macbride's book is the carefully dated synonymy preceding his description of each species. The plates are clearly drawn, evidently by a professional hand, and cannot fail to be most useful to the student. Although this work deals only with American species, we imagine that the English student of slime fungi can hardly afford to be without it.

The Story of Ice. By WILLIAM A. BREND, B.A., B.Sc., F.G.S. 228 pp., 6¼in. × 4in., with 37 illustrations. (London: George Newnes, 1899.) 1s.

This is one of the most interesting of Messrs. Newnes' "Library of Useful Stories." The subject in itself is sufficiently fascinating, and the illustrations tend to render lucid the pleasant letterpress of the author.

The Wanderings of Atoms. By M. M. PATTISON MUIR, M.A. 192 pp., 6¼in. × 4in. (London: George Newnes, 1899.) 1s.

In writing the story of the wanderings of atoms the author has had a stiff task before him to make an apparently dry subject intelligible reading. He has, however, fully succeeded. He deals especially with the carbon atoms and their association with others under varied conditions, from the bloom on ripening fruit, through many organisms, in diverse directions.

The book is popularly written, as it is also one of the Library of useful stories above mentioned. It is a work requiring some knowledge of Chemistry, to be fully appreciated.

Views on Some of the Phenomena of Nature. By JAMES WALKER. Pt. 2. vi. + 187 pp., 7¾in. × 5in., illustrated. (London: Swan Sonnenschein and Co., 1829.) 2s. 6d.

Although we have been tempted to search the pages of this work in the hope of finding them useful to our readers, we have unfortunately not succeeded. The author has views of his own on many subjects, which will hardly find favour with those well competent to judge.

History of Wireless Telegraphy, 1838-1899. By J. J. FAHIE. xvii. + 325 pp., 7½in. × 5in., with frontispiece and 60 illustrations. (Edinburgh and London: William Blackwood and Sons, 1899.) 6s.

In the book before us, Mr. Fahie has collected in a careful manner a complete history of the work done in telegraphing through space without conducting wires. To one at all interested in the subject, and few are not at the present moment, the book makes over 300 pages of valuable reading. The author has gone to a great amount of trouble in obtaining details of the work of earlier experimenters, and of the correspondence between them. Indeed, in reading about this earlier work, one asks why the development of the subject remained latent so long. Professor Schuster in 1874, Professor Hughes in 1879, both got hold of one of the most important points in connection with wireless telegraphy, viz.:—the loose contact action, or what is now known as the coherer principle. These and other important points are brought out in the appendices at the end of the book. The author divides the history into three periods. (1) The "Possible," where we are given the work of Steinheil (1838), of the hard-working Lindsay, of Dundee (1843), of Dr. Loomis (1872), and others. (2) The "Practicable," which includes the more solid work of such authorities as Trowbridge (1880), Graham Bell (1882), Dolbear (1883), Edison (1885), and others. (3) The "Practical" period, which brings us down to the systems being worked out at the present day. Foremost among these come the extensive series of experiments upon electro-magnetic induction, which were commenced as far back as 1882, by Sir Wm. Preece, in telegraphing from Southampton to the Isle of Wight, without connecting wires. These were followed by further work in Durham, in the Bristol Channel, in South Wales, and elsewhere. Since March, 1898, Preece's method has been officially established for signalling between Lavernock Point and the Flat Holm in the Bristol Channel. A full description is next given of Mr. Willoughby Smith's conduction method, and then the familiar name of Marconi is introduced. Working upon the experimental results of Hertz, Marconi has, during the last few years, so utilised and brought under control the Hertzian waves, that his system of signalling through space is, at the present time, being very successfully worked at a great number of stations. Pages 177-245, on Marconi's method, are particularly interesting, and bring the subject quite up to date. We are given a reprint of Marconi's patent. His arrangements detailed in that specification (1897) are in the main the same as he is employing at the present day. —*J. Q.*

Among other books received for notice are *The London University Guide*, 1899-1900 (London: Univ. Corr. Coll. Press); *The Yorkshire Ramblers' Club Journal* (London; T. Fisher Unwin), 2s.; *Synonymic Catalogue of the North American Rhopalocera*, by Henry Skinner, M.D. (Philadelphia: American Entomological Society, Box 248), $1.00; *Insects Injurious to Garden and Orchard Crops*, by F. H. Chittenden (Washington: Department of Agriculture. Bull No. 19, N.S.); *Transactions British Mycological Society* (Worcester: Baylis and Son), 3s. 6d.; *Transactions South Eastern Union of Scientific Societies for* 1899 (London: Taylor and Francis), 3s.; *Canadian Experimental Farms. Reports for* 1898 (Ottawa: S. E. Dawson); *Calendar Birkbeck Literary and Scientific Institution*, 1899-1900 (London: Witherby and Co.), 6d.; *The Larvae Collector's Guide and Calendar for British Lepidoptera* (Dartford: J. and W. Davis), 1s.; *Report of the Department of Public Works for New South Wales to June*, 1898 (Sydney: W. A. Gullick); *Limurite in Tasmania*, by W. H. Twelvetrees and W. F. Petterd, C.M.Z.S. (Reprint from Proceedings of Royal Society of Tasmania, 1899); *Transactions Leicester Literary and Philosophical Society*, Vol. V., Pts. III. and IV. (Leicester: Gibbons and Co., 1899), 6d. each; *Transactions Guernsey Society of Natural Science*, 1898 (Guernsey: Richard).

SCIENCE GOSSIP.

THE funds now available for the joint Committee on Arctic exploration amount to upwards of ninety thousand pounds.

WE have received a copy of the American journal, "Popular Science," which contains, among others, an illustrated article by Professor H. L. Osborn on Land Snails and Slugs.

AMONG recent additions to the Natural History Department of the Dublin Museum is a collection of Irish land and freshwater shells, and also one of Pyrenean land-shells.

WE have received from Messrs. Williams and Norgate, Oxford, the English agents, a copy of the catalogue of second-hand Mathematical and Astronomical books offered by F. Pietzcker, of Tubingen.

AMONG the arrangements for the eighth winter session of the Limerick Field Club is a series of six lectures on the "Elements of Geology," by Mr. George H. Carpenter, B.Sc., on Tuesdays and Wednesdays, commencing 13th March.

THE Field Columbian Museum has issued an illustrated description of some new plants of the familiar Dioscoreaceae and Amarthaceae, including a new genus of the former, named *Higinbothamia*. These interesting plants are from Dr. C. F. Millspaugh's recent Yucatan and West Indian collections.

THE second "National Photographic and Allied Trades" Exhibition will be held in the Portman Rooms, London, from April 27th to May 5th next. Applications for space and particulars are to be made to Arthur C. Brookes, Harp Alley, Farringdon Street, E.C.

THE Essex County Council has issued the prospectus and time tables for the autumn, winter, and spring sessions of the County School of Horticulture at Chelmsford. The classes will meet daily for demonstrations and practice. Particulars may be obtained from J. H. Nicholas, County Offices, Chelmsford.

THE Quekett Club has lost an interesting member by the sadly sudden death of John W. Reed, F.R.M.S., F.R.G.S., of Colebrooke Row, London, N. Mr. Reed was an ardent microscopist and a field botanist, studying both the British and Continental Flora. Among other papers read by him was an excellent one on "Plants Collected in the Pyrenees." Mr. Reed was about 50 years of age.

MR. E. A. MARTIN informs us that a petition was recently presented to the Croydon County Council from 7,500 inhabitants of Croydon, praying that the Hurst might be purchased at a cost of £20,000, to be covered by a rate of a farthing in the pound for fifty years. A resolution embodying the request of the petitioners was defeated by eighteen votes to seventeen. In view of the narrowness of the division, the subject will be again revived, the ratepayers being largely in favour of the retention of the charming woodland as a public reserve. We trust that no stone will be left unturned to secure this laudable object.

A COURSE of five popular elementary lectures on astronomy will be given on successive Monday evenings at 8.30, commencing on 20th November, at the Hampstead Library, Prince Arthur Road, by Mr. P. E. Vizard. The series is under the auspices of the Hampstead Astronomical and Scientific Society. Particulars may be obtained from Mr. H. W. Woodman, Hon. Astronomical Secretary, 31, Carlingford Road, Hampstead, N.W.

THE annual course of Christmas lectures, specially adapted for young people, at the Royal Institution, will this year be delivered by Mr. Charles Vernon Boys, F.R.S. The subject will be "Fluids in Motion and at Rest." The lectures (which will be six in number) will commence on Thursday, December 28th, at three o'clock. The remaining lectures will be delivered on December 30th and on January 2nd, 4th, 6th and 9th, 1900.

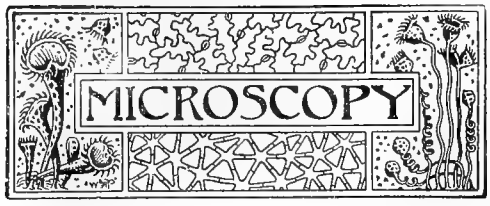
WITH Her Majesty the Queen's approval, the Copley medal of the Royal Society has this year been awarded to the Right Hon. Lord Rayleigh, F.R.S., for his contributions to physical science. Royal medals go to Prof. George Francis Fitzgerald, F.R.S., for physical science, especially optics and electricity; and to Prof. W. Carmichael McIntosh, F.R.S., for his monograph on British Marine Zoology applied to fisheries industries, and his connection with the Marine Biological Laboratory at St. Andrew's. The Davy medal is awarded to Mr. Edward Schunch, F.R.S., for investigations on madder, indigo and chlorophyll.

MR. JOHN H. WEEKS, in a letter to the "Times" of November 16th, gives a curious account of the introduction into the Congo region of the troublesome little insect, the chigoe. He states that on his arrival at San Salvador in 1882, he found many boys of ten or twelve, who well remembered the time when they were not known, but they are supposed to have been imported in the following manner:—A barque trading between Brazil and St. Paulo de Loando arrived at the latter place in ballast, but as cargo was to be taken on board the master wished to throw the ballast into the sea. This Portuguese officialism would not permit. It was, therefore, thrown on to a spit of sand forming part of the harbour. The ballast was impregnated with chigoes, which have gradually spread across Africa.

WE have received for notice a large and useful teapot, constructed on scientific principles. The object is to avoid too long infusion of the tea, with the consequent extraction of the tannin and other deleterious substances. The inner side of the teapot is carried round beneath the lid, so as to form a deep flange which, being air-tight, does not permit the water to rise within its space. Beneath the lid is a drainer to contain the tea leaves. When the pot is filled up with water and the tea has stood the requisite time in the drainer, according to taste, a little metal valve connected with the space within the flange is turned, to allow escape of the air imprisoned therein. The water on the tea sinks into the pot to replace the escaped air, leaving the tea without further infusion. The name given is "The Geisha."

The Geisha teapot will be found useful by medical men and dispensing chemists for making medicinal infusions: as the exact time, necessary for extracting the required properties from the leaves or roots, can be regulated by the small valve mentioned.

We would remind the readers of SCIENCE-GOSSIP that there is a standing invitation for them to visit its offices on Thursday afternoon, between four and six o'clock. On those occasions they will have opportunity of testing the scientifically-brewed tea, from the Geisha teapot.



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

PREPARING AND MOUNTING WOOD SECTIONS.—Mr. J. D. King in a recent paper in the "Journal of Applied Microscopy" gives a very practical exposition of his methods of preparing and mounting wood sections. He lays stress upon the necessity of using a good knife of the finest steel and the finest edge, as well as a thoroughly satisfactory microtome. We have found the ordinary English section-knife or razor barely strong enough for this purpose, and a properly sharpened plane-iron is preferable. For embedding, hard paraffin should be used, as it shrinks less and holds the object more firmly. It will probably roll, but a light pressure with the ball of the finger when cutting will remedy this. The thickness of the sections is a matter of some importance, and the general tendency is to cut them too thin. If transparency is required, the sections must be bleached, and this requires care, as over-bleaching destroys the fibres of the section, and under-bleaching leaves a blotchy appearance. Mr. King suggests bleaching until the colour is discharged from the wood, but no longer, and then a very thorough washing with water. In this connection we think an "anti-chlor" such as hypo-sulphite of soda might be used with advantage, but in any case the final washing must not be curtailed. The stains recommended are Delafield's haematoxylin, Bismarck brown, and for double staining, Grenachers borax carmine and methyl or aniline green. The haematoxylin is the most generally useful, but is commonly made in too strong a solution. It is best to stain slowly in a comparatively weak solution, and when using this reagent it is a good plan to wash finally in hard water from a tap, which has a tendency to fix the colour. The Bismarck brown is useful for very delicate structure, or for large spiral or scalariform vessels. The double staining is best carried out by immersing the section in borax carmine for twelve hours or more, washing quickly, but well, in 50 per cent. alcohol, placing for two or three seconds only in aniline or methyl green, washing as before, and then again staining in borax carmine till the red reappears, changing the supply of stain after the superfluous green is driven out. Mr. King recommends finally mordanting the section in alum cochineal. He gives the needed warning that 95 per cent. alcohol will precipitate borax carmine, and that alcohol and haematoxylin must be kept separate. He recommends that glycerine jelly be used as a mounting medium, but Farrant's solution, or Canada Balsam will give satisfactory results. The great difficulty will lie in getting rid of air-bubbles, especially "stowaways," and these must be carefully worked out with a dissecting needle under a dissecting microscope.

DENDRITIC CRYSTALS IN PAPER.—Several correspondents have been good enough to send us specimens of these, as requested in last month's SCIENCE-GOSSIP. Will any of our readers who have observed such crystals in papers *other than blue tinted* papers, kindly send us particulars, and if possible some of the examples for examination, which can be returned.

LOCUST DISEASE FUNGUS.—Reports in the *Agricultural Journal*, published by the Cape Department of Agriculture, give most interesting accounts of the success attained in many districts in the extermination of locusts by means of the locust disease fungus. The fungus is prepared by the Bacteriological Institute, Grahamstown, and any applicant can obtain a tube for the sum of sixpence. The reports show that in one case about a hundred locusts inoculated with the disease were distributed amongst a swarm, and next morning and within a few days after, large numbers of locusts were lying dead amongst the sand-dunes. The microscopical examination and subsequent experiments showed that they were unquestionably killed by the fungus. The growth of fungus from the dead locusts produced a fungus smaller in size, but more rapid in its growth, than the Government fungus. In another case young locusts were immersed in lukewarm water, in which the fungus had been mixed, and then set free. Three days afterwards rain fell, and on the fourth day small heaps of locusts were found about three miles away from where they had been immersed. Other districts in which no such means of inoculation were carried out were found to be much more infested with locusts. We shall await further reports with interest.—*F. Shillington Scales.*

NOMENCLATURE OF NUMMULITES PERFORATA.—I have received a note from Mr. Fortescue W. Millett, the eminent authority on Foraminifera, with regard to the nomenclature of *Nummulites perforata*, which will be interesting to your readers studying these forms. He says:—"I have seen your paper in SCIENCE-GOSSIP on the forams of the Tocha Valley. *N. perforata* was not so named for the reason you suggest (*ante*, p. 165). The rude figure of *Egeon perforatus* being the xlii. genre of Montfort's Conch. Syst. 808, p. 167, is either a copy, or an imitation of Fichtel and Moll's figure of *Nautilus lenticularis* var. Test. Micr. 1798, p. 57, pl. vii. fig. h. It represents a shell with sinuous striae, between which are tubercules or perforations, hence Montfort's name."—*Arthur Earland, 28, Glenwood Road, Catford.*

ANSWERS TO CORRESPONDENTS.

NAIDS.—V. T. (Chorley.)—The annelids you send are Naids—*Nais proboscidea*; so called from its long and contractile prostomium. It is common amongst Lemnae, and its wonderful transparency makes it a most interesting microscopic object when living. The contractions and dilations of the vascular trunk can be easily observed, as also the constant movement of the prostomium, which though contractile, is not retractile. During the summer months the Naids frequently reproduce themselves by fission, a new individual being formed by constriction at one of the segments.

HEPATIC.—J. T. (Streatham).—Mr. W. West, of Bradford, has kindly identified your Hepatic, as *Lejeunia serpyllifolia*, a plant which varies much as to locality.

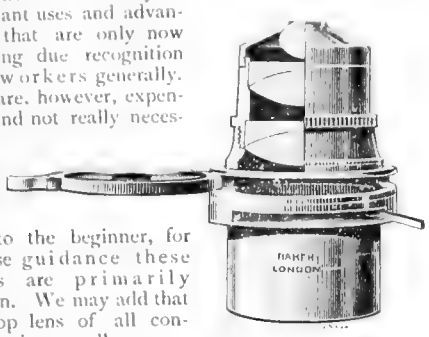
MOUNTING BOTANICAL SLIDES.—J. R. (Rapallo, Italy.)—The best book for the beginner is Cross and Cole's "Modern Microscopy." Pages 114 and 144 to 154 deal specifically with the mounting of botanical specimens and are most clear and lucid, as might be expected from a mounter of Mr. Cole's experience. I would also recommend strongly to your notice Strasburger and Hillhouse's "Practical Botany" which, written primarily for the student of botany, contains eminently practical instructions in microscopical technique, and should be mastered by all who are interested in plant life.

MICROSCOPY FOR BEGINNERS.

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

(*Continued from page* 184.)

The achromatic condenser of 1 N.A. is greatly superior to the Abbé illuminator mentioned previously. The aperture is nominally smaller, but its aplanatic cone frequently exceeds .7 N.A., and it has the additional advantage of being achromatic. We unhesitatingly advise its selection if the student can afford the extra cost. Prices vary with different makers. We may add that this condenser gives also excellent results in photography. The immersion condensers now sold by the leading makers, two of which have been noticed recently in Science-Gossip, have important uses and advantages that are only now receiving due recognition from workers generally. They are, however, expensive, and not really necessary to the beginner, for whose guidance these papers are primarily written. We may add that the top lens of all condensers is generally removable so as to give a larger illuminated field when a low power lens is being used.



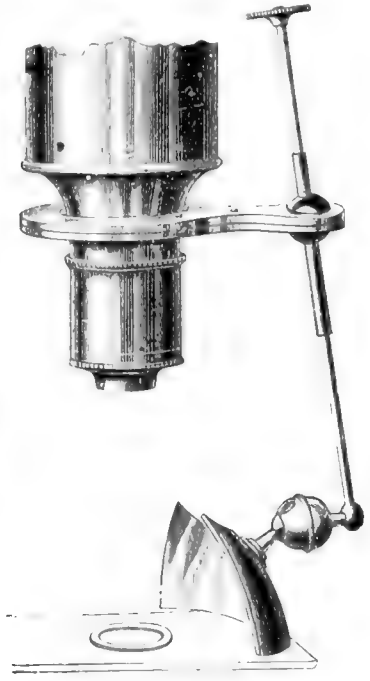
Achromatic Condenser.

The mount of the condenser will either be carried by the focussing and centering stages mentioned when dealing with stands, or will slide in a short tube-ring affixed to the under side of the stage. Of course the former is much preferable, not only in the facilities it gives for focussing, but also for centering; though at least one maker provides a non-focussing sub-stage ring, that is fitted

Carrier and Spots.

with centering screws, and can also be readily swung aside when not wanted. Here again, however, cost will probably enter into the matter. Very often there is a ring beneath the mount into which various stops can be placed to give oblique illumination (necessary for certain diatoms and similar work), or to give dark ground illumination by means of a central black spot, varying in size with the objective used, and which acts by cutting out the central rays of light, leaving the marginal rays to be refracted into the objective by the object on the slide. This gives most beautiful effects, but is not often used for critical work. The spot-lens proper, and the paraboloid, are not now much used.

An iris diaphragm is very greatly superior in convenience to any form of diaphragm plate, whether it be a revolving plate or a series of stops. Under any circumstances the diaphragm should be *beneath* and not above the condenser, as we have seen it in certain microscopes. Polarizing apparatus, though giving beautiful effects, is only useful for certain classes of work, mainly petrological or crystallogical. It can be added at any time if required. The bull's-eye condenser on the ordinary stand is too well known to need description here. Its cost is from 6s. to 15s. As ordinarily made it is nearly hemispherical, and its chromatic and spherical aberrations are most marked. It can be used with transmitted light to strengthen the illumination from a lamp, in which case its plane side should be turned rather near to the flame, the adjustment being made so as to allow almost parallel light to fall upon the mirror. A piece of white paper is a useful assistant in doing this. For opaque objects requiring illumination on the stage (reflected light), where either artificial light or daylight is the source of illumination, it is usual to place the flat side of the bull's-eye near the object and the spherical side at some distance from the lamp, if a lamp



Side Silver Reflector.

be used. Some little practice is necessary in these matters at first, as well as in the management of the condenser proper, to which we shall allude more particularly later on. For objects to be viewed by reflected light the side silver reflector is very convenient, but costs about 25s.

If the tailrod carrying the concave mirror will allow of the latter being adjusted above the stage, excellent illumination can be got by this means, as mentioned in Science-Gossip, Vol. V., page 377.

WILLIAM FARREN WHITE, an entomologist, better known a few years ago, died last summer at Bournemouth in his 66th year.

JOHN BRIDGEMAN, a well-known East Anglian entomologist and a vice-president of the Norfolk and Norwich Naturalists' Society, died on October 6th, at the age of 63 years. He had presented his collections to the Norwich Museum some time previously.

JAMES CARPENTER died recently. He was associated with the late Mr. Nasmyth in producing "The Moon, considered as a Planet, a World, and a Satellite," which is illustrated by perhaps the most realistic pictures of portions of the moon which have ever been published.

GEORGE DOWKER.—This well-known Kentish botanist died suddenly on September 22nd shortly after his return to his home in Ramsgate from the British Association meeting at Dover. Born 2nd April, 1828, at Stourmouth House, Stourmouth, he was educated at Sandwich Grammar School and Hodsdon Agricultural College. He was afterwards engaged for some years in agriculture. In addition to being an authority on Kentish plants he was a geologist of some repute, having written on the chalk of Thanet and the water supply of East Kent. He was once president of the Margate Microscopical Club, and has written considerably in "Archalogia Cantiana" on the archaeology of East Kent.

WILLIAM PAMPLIN.—We learn from *Nature* that William Pamplin, the *doyen* of English botanists, died on August 9th, in his ninety-third year, near Bala, in North Wales, in the vicinity of which he has lived for many years since his retirement from London, where he conducted the business of a second-hand bookseller. He was an Associate of the Linnean Society, having been elected in 1830. He was one of the founders of the "London Catalogue of British Plants," and an authority on geographical distribution of our flora. In 1827 he published what must now appear a curious list of the rarer plants of Battersea and Clapham districts, since nearly covered by houses.

EDWARD LYON BERTHON.—For many years Vicar of Romsey, in Hampshire, the Rev. E. L. Berthon died on October 27th, in his 87th year. He was never a great observer, yet one who has done much to help forward others. The Berthon observatory, built of wood and canvas, has proved a welcome shelter to many a hard worker. His "saddle" equatorial stand is very convenient in use. He mounted in this manner the 9¼in. With, belonging to Rev. T. W. Webb, and he also mounted an 18in. mirror for the Rev. Cooper Key. His dynamometer, for measuring the magnifying power of telescopes, is well known. The Berthon collapsible boat has, perhaps more than anything else, made him famous. He had also a larger share than is generally known, we believe, in the introduction of the screw propeller into steam navigation.

JOHANN CARL WILHELM FERDINAND TIEMANN, professor of chemistry in the Berlin University, and editor of the "Proceedings of the German Chemical Society," died at Meran on November 14th of heart disease. He was the originator of numerous important researches in pure chemistry, having for their object the discovery of the constitution of camphor, the terpenes, and other organic bodies. He founded, as a result of his labours, a new and valuable branch of chemical industry in the manufacture of artificial flavouring matters and perfumes. The value of "ionone," as is named the violet scent, is said to be almost fabulous, so greatly is it in demand.

W. J. MYERS.—We much regret to chronicle the death of Major W. J. Myers, of Willowbank, Eton, retired major from the King's Own Rifles, who was killed in action at the battle of Farquhar's Farm, in Natal, on October 30th. This gallant soldier sailed for South Africa unofficially, but firmly resolved to fight again. He did not take long to find his opportunity, for arriving on a Friday at Capetown, he fell at the front on the following Monday. Major Myers was well known as a traveller, a collector and an antiquarian. Many of his fine Egyptian and Persian specimens form loan collections at the Victoria and Albert Museum. Others, which from time to time, up to within a few days of his departure, he presented to Eton College Museum, are there to be seen. Intimately connected with Eton as Adjutant to the College Volunteers, and as an old boy himself, his place will not soon be filled, while he will perhaps best be remembered by his many gifts to the Boys' Libraries. As a naturalist Major Myers was best known as a coleopterist, having had a good knowledge of tropical and other exotic beetles.

JOHN WILLIAM DAWSON, C.M.G., LL.D., F.R.S., F.G.S. The death of this well-known Canadian geologist and naturalist, was recently announced, in his seventy-first year. He was born in Nova Scotia, but was sent to the University of Edinburgh for his education. On his return home he devoted himself to the study of the natural history and geology of Nova Scotia, and New Brunswick. In 1842 and 1852 he accompanied Sir Charles Lyell in his explorations in Nova Scotia. Since that date he has contributed largely to the proceedings of the London Geological Society, besides publishing many books and monographs on special subjects connected with geology, especially the Land Animals and Plants of Palaeozoic Period. His volumes on the "Devonian and Carboniferous Flora of Eastern North America" are the most important contribution yet made to the Palaeozoic botany of North America. He also was the first to describe the *Eozoön canadense* of the Laurentian limestones, the oldest known supposed form of animal life, which has led to much discussion. In 1850 he was made superintendent of Education for Nova Scotia, and in 1855 he became Principal of the McGill University at Montreal, a position he resigned after a successful career in 1893. In 1882 he received the Lyell Medal of the Geological Society of London. For eminent geological discoveries, he was created a Companion of the Order of St. Michael and St. George, and was knighted by Her Majesty in 1884. He was requested by the Marquis of Lorne, then Governor-General of Canada, to take the first Presidency of the Royal Society of Canada, in the formation of which he had taken an active part. In 1886 Sir John Dawson was elected President of the British Association. At that meeting he delivered a most remarkable and powerful address, taking for his subject the Geological History of the Atlantic Ocean. His death will be a loss to science, as well as to his many friends.

SCIENCE-GOSSIP.

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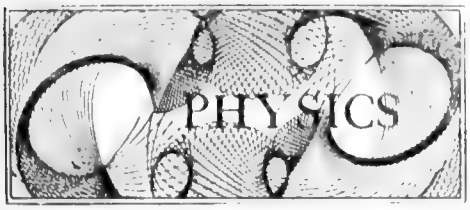
Special quotations for a series of insertions, any size space, matter changeable, on application.

SITUATIONS WANTED will be inserted at the special rate of 2s. 6d. per insertion.



CONDUCTED BY JAMES QUICK.

GLASGOW UNIVERSITY.—Prof. Andrew Gray, Lord Kelvin's successor, delivered his introductory address on October 20th. It was a great honour and privilege, he said, to return to his old university and again to teach in the department of natural philosophy. He then went on to speak of the inter-connection of theory and practical applications in physics, referring to the permanent work of such men as Galileo, Bacon, Newton, Maxwell and Hertz, the results of which work are so beneficial at the present time. In conclusion he said that Glasgow University was very advantageously placed with respect to physical science, and in that University they wanted to give a new example, on a great scale, of the inter-connection of theory and practice on which he had particularly addressed them.

WIRELESS TELEGRAPHY IN SOUTH AFRICA.—As a result of an arrangement made between the Government and the Wireless Telegraph and Signal Company, six sets of apparatus were dispatched from Liverpool on November 2nd for Capetown. These are to establish telegraph stations for transmitting war news in South Africa. They are under the charge of five assistants from the staff of the company, the Government also, having sent an engineer.

PHYSICAL SOCIETY OF LONDON.—The first meeting of this Society for the present session was held on October 27th, Prof. W. E. Ayrton, F.R.S., Vice-President, in the chair. Dr. S. W. Richardson read a paper on "The Magnetic Properties of the Alloys of Iron and Aluminium." The author experimented upon four alloys, the percentage of aluminium ranging from 3·64 to 18·47 and the temperatures of the experiments from —83° C. to 900° C. Mr. G. L. Addenbrooke exhibited a model illustrating a number of the actions of the flow of an electric current, and Mr. W. Watson showed some of Prof. Lecher's experiments with the Wehnelt electrolytic break. It was very clearly seen by these experiments that subsequent sparks tend to pass through the portion of air heated by the first one.

A PROBLEM IN PHYSICS.—Some years ago, one of your contemporaries offered a prize for the best answer to the question, Does a ball thrown straight up in the air occupy the same time in descending as in ascending? I thought the matter out, and sent in my reply arguing that it would not fall so quickly as it rose; but the prize was given to someone who argued that the times would be equal. On discussing the matter afterwards with a well-known physicist, I found that he too was under the impression that the times would be equal: and in view of this apparently general impression, it occurs to me that your readers may be interested in the following, which I think is a complete demonstration that the times would not be equal, the descent occupying longer time. As every student of Physics is aware, a ball thrown vertically upwards in a perfect vaccum, with sufficient initial velocity to carry it to a height of 50 feet, would occupy the same time in falling as in rising. Its gradually increasing velocity when falling would be the exact counterpart of its gradually decreasing velocity when rising, so that at the end of the fall its velocity would be the same as at the beginning of the rise. When, having to overcome the resistance of the atmosphere, however, the ball, though thrown with the same initial velocity, would not rise so high, say only 40 feet. We have already seen that it requires a fall of 50 feet in a vacuum to reproduce its initial velocity, from which it is evident that the fall of 40 feet, opposed by the resistance of the atmosphere, will be insufficient to give it this velocity. Now, consider the ball at 10 feet from its starting point. It has a velocity that would take it to a certain height in a vacuum, but the resistance of the atmosphere prevents it rising so high. Arguing as above, it can be shown that when the ball returns to this point, its velocity will be less than at the same point during its rise, and similarly for every other point. That is to say, at no point during the fall is the velocity so great as at the same point during the rise, which of course means that the fall will take longer.—W. F. DUNTON, *60, Cathles Road, Balham.*

[The point is interesting and Mr. Dunton's argument is probably sound. In vacuo, of course, as Mr. Dunton states, there being no air resistance, the times of ascent and descent are the same. In air, however, the air resistance always acts as a negative force and therefore produces an acceleration opposing both the up and down motion. Suppose a be the acceleration due to the air friction, g that due to gravity, then when the body is ascending the acceleration reducing the motion will be $-(g+a)$; on the downward journey it will be $g-a$. Now the space s travelled each way is the same, therefore from the equation $s = \frac{1}{2} ft^2$ or $t = \sqrt{\frac{2s}{f}}$ (where f is the total acceleration) we have in the first case $t_1 = \sqrt{\frac{2s}{g+a}}$ and in the second case $t_2 = \sqrt{\frac{2s}{g-a}}$ t_2 is therefore less than t_1. The above assumes that the air friction is constant for the varying velocities of the body. This assumption is not strictly true, the friction increases as the velocity decreases, but not in any simple ratio. Further communications on this or any other physical topic, will be welcomed for discussion in these columns.—J.Q.]

MONOCHROMATIC LIGHT.—In a recent number of "Comptes Rendus," a description is given of MM. Fabry and Perot's work upon monochromatic lights. Although the sodium flame is an exceedingly useful source for general purposes, and is so easily obtained by a little common salt inserted into any convenient flame, yet for some particular purposes it is at a disadvantage. Especially is this felt at times in photographic work, as the sodium lines appear in a part of the spectrum to which the ordinary photographic plate is practically insensitive. MM. Fabry and Perot's arrangement, although more complicated than that for the ordinary sodium flame, permits of obtaining violet, yellow and green monochromatic rays. An electric arc is produced, in a Torricellian vacuum, between two mercury surfaces in the two limbs of an inverted U tube. The arc is obtained by shaking the tube, thus completing the circuit momentarily by a splash of the mercury. The violet rays produced may be cut off by interposing yellow glass, or a thin layer of bichromate of potassium. The green and violet rays may be eliminated by a solution of eosine, and the yellow rays by a strong solution of didymium chloride. To obtain the green rays only, a mixture of didymium chloride and potassium bichromate, may be used.

CONDUCTED BY F. C. DENNETT.

1899		Rises.	Sets.	R.A.	Dec.	
	Dec.	h.m.	h.m.	h.m.	° ′	
Sun	3	7.48 a.m.	3.52 p.m.	16.38	22.7	S.
	13	7.59	3.49	17.22	23.10	
	23	8.6	3.52	18.6	23.27	

	Dec.	Rises h.m.	Souths h.m.	Sets h.m.	Age at Noon. d. h. m.
Moon	3	8.15 a.m.	0.16 p.m.	4.13 p.m.	0 11 12
	13	1.19 p.m.	9.9 p.m.	3.57 a.m.	10 11 12
	23	11.5 p.m.	4.31 a.m.	10.50 a.m.	20 11 12

	Dec.	Souths h.m.	Semi-Diameter	Position at Noon. R.A. h.m.	Dec. ° ′	
Mercury	3	0.17 p.m.	4.9″	17.6	22.20	S.
	13	10.53 a.m.	4.4″	16.20	18.36	
	23	10.26	3.4″	16.33	19.38	
Venus	3	1.15 p.m.	5.3″	18.4	24.30	S.
	13	1.31	5.3″	18.59	24.8	
	23	1.45	5.6″	19.52	22.23	
Mars	13	0.31 p.m.	2.0″	17.59	24.15	S.
Jupiter	13	10.13 a.m.	14.5″	15.41	18.47	S.
Saturn	13	0.13 p.m.	7.0″	17.41	22.21	S.
Uranus	13	11.1 a.m.	1.7″	16.29	21.45	S.
Neptune	13	0.16 a.m.	1.3″	5.42	22.5	N.

MOON'S PHASES.

		h.m.			h.m.
New	Dec. 3	0.48 a.m.	*1st Qr.*	Dec. 9	9.3 p.m.
Full	,, 17	1.31 a.m.	*3rd Qr.*	,, 25	3.57 a.m.

In perigee, December 7th, at 6 a.m., distant 229,100 miles; and in apogee on 22nd, at 11 p.m., distant 251,600 miles.

CONJUNCTIONS OF PLANETS WITH THE MOON.

				° ′	
Dec. 1	Jupiter†	10 p.m	planet	3.7	N.
,, 3	Mercury*	1 p.m.	,,	0.48	N.
,, 3	Ceres*	4 p.m.	,,	0.9	S.
,, 3	Mars†	9 p.m.	,,	0.56	S.
,, 4	Saturn†	1 a.m.	,,	0.39	N.
,, 4	Venus*	2 p.m.	,,	2.11	S.
,, 29	Jupiter†	6 p.m.	,,	2 35	N.
,, 30	Mercury†	11 p.m.	,,	1 30	N.
,, 31	Saturn*	4 p.m.	,,	0 20	N.

* Daylight. † Below English horizon.

OCCULTATIONS AND NEAR APPROACH.

Dec.	Star.	Magnitude.	Disappears h.m.	Angle from Vertex. °	Reappears h.m.	Angle from Vertex. °
15.	K^2 Tauri	5.5	2.48 p.m.	90	3.34 p.m.	321
15.	K^1 Tauri	4.6	2.55 p.m.	64	3.27 p.m.	347
17.	Neptune	—	3.36 a.m.	118	4.11 a.m.	180
19.	*f* Geminorum	5.2	6.31 a.m.	120	7.9 a.m.	198
24.	*e* Leonis	5.1	7.36 a.m.	5	Near Approach.	

ECLIPSE OF THE SUN.—On December 2nd there will be an annular eclipse of the sun, visible only in the very southern latitudes, the central line passing within a few degrees of the southern pole.

ECLIPSE OF THE MOON.—On the night and morning of December 16th and 17th there will be a partial eclipse of the moon, the phenomena occurring as below :—

	h.	m.	
16th.—First contact with penumbra	10	34	p.m.
16th.—First contact with shadow	11	45	p.m., 66° from N. point to E.
17th.—Middle of eclipse	1	26	a.m.
17th.—Last contact with shadow	3	7	,, 59° from N. point to W.
17th.—Last contact with penumbra	4	18	,,

The magnitude of the eclipse is 0·995, the moon's diameter equalling 1·0.

THE SUN still remains in a very quiescent state, only occasional sun-spots appearing. Winter is said to commence when the sun enters the sign Capricorn at 1 a.m. on 22nd of December.

MERCURY is an evening star at the commencement of the month, but at 5 a.m. on 6th is in inferior conjunction with the sun, afterwards becoming a morning star, reaching its greatest western elongation (22° 5′) at 1 p.m. on Christmas Day. At 2 p.m. on 10th, Mercury is in conjunction with and 2° 28′ north of Uranus. At 5 a.m. on 23rd Mercury is again in conjunction with Uranus, the former being 2° 17′ to the north. It is poorly placed for the telescopist.

VENUS is an evening star all the month in Sagittarius, not setting until more than two hours after the sun at the end of the month, but its great southern declination militates against successful observation.

MARS is an evening star all the month, near Venus at the beginning, and also in Sagittarius. At midnight on the 6th, Mars is in conjunction with and 1° 48′ south of Saturn. He is too near the sun for observation.

JUPITER is a morning star in Libra until about 23rd, when it enters Scorpio. At the end of the month it rises more than three hours before the sun, but its great southern declination will be detrimental to successful observation.

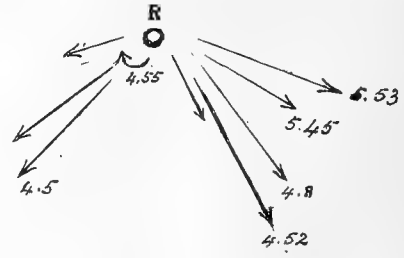
SATURN is in conjunction with the sun at 7 p.m. on 17th, and is, like Uranus, too near the sun for observation.

NEPTUNE is in opposition to the sun at 5 p.m. on 17th December, and is well placed for observation in the eastern part of Taurus, a little N.f. (*i.e.*, north-east of) the third magnitude star ζ. Its occultation by the moon on the morning of the 17th should be observed. As a telescopic object it is somewhat disappointing.

METEORS.—Notable days for meteors are 8th, 9th, 11th, 12th, and 21st of December.

BRILLIANT METEOR.—On Sunday, November 12th, in company with some friends, I observed an unusually brilliant meteor. We were coming along Westbourne Grove, in the West of London, at 10h. 10m. p.m., when it appeared, taking a course S.S.W. to N.N.E.—*Fred. Noal Clark, Paddington Infirmary, London, W.*

THE LEONIDS.—English observers were generally unsuccessful in seeing the November Leonids. Next month we hope to give fuller details. At Southend, in Essex, our Editor saw at intervals of clear sky, on the morning of the 15th, nine meteorites only, and



has furnished a diagram with approximate times of some of them. They all came from the radiant point in the centre of the sickle in the constellation Leo. The short curved path shown on the diagram was the most brilliant seen. The earlier part of the night was foggy. Although clear, no meteorites were seen during a five hours' watch on the next night.

CHAPTERS FOR YOUNG ASTRONOMERS.

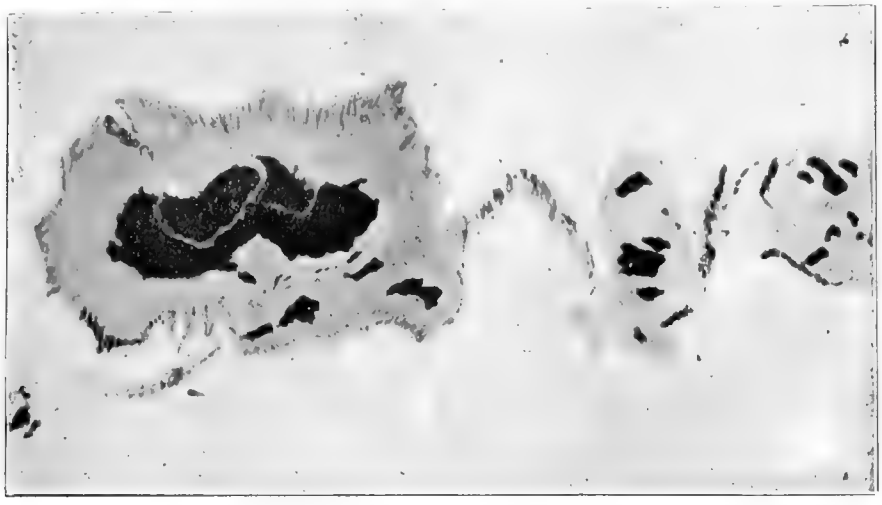
By Frank C. Dennett.

THE SUN.

(*Continued from page 187*)

The group of sunspots of 1890 already referred to took no less than forty-four hours to cross the sun's apparent central meridian; and covered an area of about 2,400,000,000 square miles. It is well to take the measurements of groups from day to day, because the extent of surface covered, often varies very considerably in the course of a few hours.

In September, 1898, a remarkable group of spots crossed the disc. On the morning of September 9th it was measured on the scale as previously described. The principal spot had a total length of over 43,000 miles, and a breadth of about 40,000 miles whilst its umbra alone was nearly 29,000 miles in length. The entire group had a length of about 130,000 miles. The greatest area of this group amounted to some 2,700,000,000 square miles. The accompanying figure is a reproduction of the drawing made with the aid of a 3-inch telescope by an observer signing himself "E.O.," and is here given by the kind permission of the Editor of the "English Mechanic," where it first appeared. This group is remarkable as being apparently the cause of a great magnetic disturbance, and a brilliant display of Aurora Borealis, both of which occurred upon September 9th, 1898. On the afternoon of the 15th of that month the large spot was visible as an indentation on the limb, and was thus photographed by Newbegin. According to the late Padre Secchi such an indentation, observed by him in 1873, had a depth of 8″ or about 3,600 miles. La Hire and Cassini were the first to thus note spots on the limb. The phenomenon is usually seen at the western limb, but probably this is due to the fact that the observer then knows where to look for such appearance, but when coming round the eastern limb, not being expected, it is lost amid the constant ripple of light.



Sunspots, as seen through 3in. Refractor Telescope.

There are decided motions amongst the spots, the distance between any given pair sometimes increasing, sometimes decreasing. Occasionally spots seem to have a motion around each other. Secchi has seen a spot which would give the impression that the observer was looking down into a whirlpool, or perhaps more correctly a cyclone, and others have in some measure confirmed this, but such spots are very rare.

There are two explanations given as to what sunspots really are. Wilson and Sir Wm. Herschel looked upon them as openings in the bright surface of the sun, or photosphere as we now call it. A duller surface beneath the photosphere revealed through this opening, forms what we know as the penumbra. The opening through this lower surface looks black and is called the umbra. Kirchoff considered rather that sunspots were due to the accumulation of dense matter over the surface, keeping the light of the photosphere from reaching us. The structure of the ordinary spot however is such that I cannot understand any practical observer holding such a theory. Very often, just as a considerable spot has come round the limb, and when it looks little more than a line, the umbra seems to rise above it, as if it were a projection beyond the general surface. I have seen this with a telescopic aperture of barely two inches. Two explanations of this phenomenon have been given. One is, that the dark matter forming the umbra is by some internal force pushed up to a height greater than the general surface of the sun. The other theory considers that the cavity of the spot is filled with a dense vapour, which by refraction apparently raises the bottom of the spot when thus observed near the limb, just as water, looked at obliquely, seems to lift the bottom of the containing vessel. Observations by our best physicists appear to give contradictory results, sometimes favouring the one theory, then the other. For this reason dogmatic assertion is to be avoided.

It may, however, be taken as a general rule, that spots of considerable size have the surface around them raised above the normal level. The inner edge of the penumbra also appears to be curved upward towards the observer, as if there were force pressing from below. The result of this is, that the surface immediately around spots near the limb seems to be much brighter than the general photosphere; and the filaments of the penumbra to brighten as they reach towards the umbra.

(*To be continued.*)

White Copper Butterfly.—The variety *schmidtii* of *Polyommatus phleas* was taken by Alfred E. Harley-Mason in a field at West Norwood during last summer. Although uncommon this aberration not infrequently occurs in Britain as elsewhere on the Continent. Another record during the past season recently appeared in the "Entomologist," a specimen, of this form, having been taken in the Forest of Dean.

Australian Scale Insects.—Permit me to correct an evident printer's error which appears in your August number (*ante* p. 90). The statement should have been that up to the time of my publishing the Australian Catalogue, out of the 1,119 species of Coccidae known to science, 235 occurred in Australia. —*James Lidgett, Myrniony, Victoria.*

Rabbit Swimming.—At the bottom of our park, which swarms with rabbits, is a small lake, having an island in the middle of it. For some time past the rabbits have been increasing steadily and encroaching on the land round the lake, and once or twice we thought we saw one on the island. Recently my brother saw one deliberately take to the water and swim from the land to the island, a distance of twenty yards. The island covers a space of about half an acre, with a few trees, and shrubs, and grass on it, but nothing specially attractive to a rabbit in the shape of roots or bulbs. Moor-hens and wild ducks build on the island, if their scanty nests could be called "building," but it is very little disturbed, as we only occasionally visit it for the birds' eggs. This was evidently not the first time the rabbit had tried the water, for it swam easily, and as though accustomed to cross and re-cross from the land to the island. We were rather struck by this occurrence, for, although we often know of hares when hunted hard taking to the water, yet we did not think that rabbits as a rule tried swimming as a pastime.—*M. Silver, Letcomb Manor, Wantage.*

Dispersion of Seeds by Birds.—When we look around Nature's Garden, whether by the river's bank, the roadside, or upon the breezy hills, and see the beauty and variety of forms everywhere displayed, we feel compelled to admire the quiet and unobtrusive methods by which the distribution of wild flowers has been obtained. In considering the various agencies that have assisted in the production of vegetation, wherever there is sufficient soil to support the growth of a plant, we are especially attracted to the wonderful part birds unconsciously take in this work of dispersion. We may also admire the beautiful arrangement by which many plants join hand in hand as it were, with birds, to secure their distribution. The mutual association for benefit which exists in many cases between plant and bird, is very striking. The plant provides food for the bird, and the bird in return furnishes a means of transferring the seed to new localities. In the case of the mountain ash, as soon as the seed is ripe the attention of birds is at once attracted by the scarlet clusters of berries, as a feast of good things. The birds, ever ready to accept such an invitation, swallow the berries, seeds and all, and when satisfied fly off to visit other places. Eventually the swallowed seeds, being well protected by their hard covering, pass out through the alimentary canal, none the worse for their journey and ready to germinate, if the place where they have been dropped is suitable. In this way it is easy to understand how a mountain ash may be found in places where it is certain it was not planted by human hands. Many other plants, whose fruit is food for birds, may be seen growing on inaccessible cliffs and in all manner of peculiar places. I noticed on one occasion upon the parapet of a bridge, within a space of three feet, no less than seventy seeds of hawthorn, that had been deposited there by birds. Many seeds of a smaller kind may be seen in a country ramble in autumn to be present in large quantities, in the droppings of various birds. Experiments which have been made, show that a considerable proportion of seeds are capable of passing through the alimentary canal without injury to future germination. A friend told me a short time since that a specimen of *Arum maculatum* had appeared in his garden, and though he had had the same garden for seven or eight years, he had never previously seen the plant there, and could not account for its appearance. It seems quite reasonable to suppose some bird, which had been feeding on the berries of the *Arum*, might have dropped the seed into the garden. As the nearest specimens of that plant, so far as I know, grow at a distance of several miles from the garden in question, this instance serves well to illustrate how a strange plant may suddenly appear in a new locality. Although this is, perhaps, the chief way by which birds scatter seeds far and wide, there

is, as may be seen from the adjoining figure of a partridge's foot, another way of attaining this end, and one probably of considerable importance. The partridge to which this foot belonged had evidently been walking about upon wet soil, and a quantity of it had adhered to the feet. With the soil were a number of the seeds that had fallen from surrounding plants, and lay on the surface of the ground. When the specimen came into my possession there were twenty-seven small seeds, apparently belonging to two different species of plants, imbedded in the mud attached to the foot. If this bird had escaped the sportman's gun, it would doubtless have carried away its little cargo of seeds, and discharged them at some distance from the place where they were taken up. There can be little doubt that the quantity of seeds which are distributed in this, so to speak, accidental manner, must be very considerable each year. It is always interesting to watch the flight of birds, but our interest should be deepened when we remember, as we see them hurrying like hasty messengers, that they are very probably the bearers of seeds, that being scattered here and there, will, in another season, help to decorate and beautify the landscape with trees and lovely flowers.—*William Thomson, 16, Cavendish Place, Carlisle.*

Aepyornis Maximus.—One of the finest specimens of this, the largest bird's egg known, was sold on November 7th, at Stevens' Auction Rooms. It measured nearly a yard in circumference, and over a foot in length. The price realised was 42 guineas. Although rarer than the great auk's egg, it has never been a favourite with English collectors. The bird formerly inhabited Madagascar, and the eggs are subfossil. It is curious to note that although it laid such large eggs the hen bird only stood half as high as an ostrich.

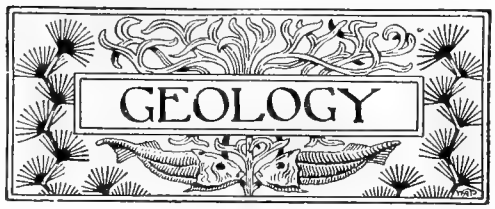
ALIEN PLANTS IN SUSSEX.—Last summer I gathered on a farm about six miles from Brighton *Solanum rostratum*, which is a native of Mexico. It is something like a tomato plant, but covered with spines about half an inch long. Another exotic plant that has established itself in Sussex is the Bathurst burr (*Zanthium spinosum*), an Australian plant, which is growing and fruiting at Kingston-by-Sea. This being a small port, the latter plant has probably been introduced through the seeds clinging to wool or other items in a ship's cargo. It is more difficult to account for the presence of the former sub-tropical plant in Sussex, though the hot, dry weather of last summer was favourable to its development.—*Thomas Hilton, 16, Kensington Place, Brighton, 5th October, 1899.*

IRISH PLANT NAMES.—In my paper on this subject, SCIENCE-GOSSIP (*ante*, p. 130), there are a few alterations necessary. Some of these have been kindly suggested to me and others I have thought desirable to change after further investigation, as being more correct. On page 130 for *Sparganium simplex* read *Phragmites communis*, reed. For Wrachalach read Urachalach. For Slan luo read slan lus. For Luso garabh read Lus garab. For Bonain Ponra curraigh read Bonain Capuil and Ponra curraigh. For Slatgoram read Slatgorm. On p. 131 Fluellin should be an English name and not as if an Irish. Neantog marabh had better be considered as *Lamium album*, and Neantog dearg as *Lamium purpureum*. For Grafar read Grafan, also for Caennabhar beag read Ceannabhan beag. Pisbuidhe, *Lathyrus pratense*. Sreann bo *Ononis arvensis*, not the var. *spinosa* which is very rare in Ireland. Pis Capuil is *Vicia sativa*. Biolar is not *Sisymbrium officinale*, but *Nasturtium officinale* water-cress. For Meastook reeil, Meastare alta read Meastore Ceeil, Meastore alta, *Hypericum androsaemum* Tutsan, and in the following line omit "Tutsan" entirely. For Baine Nuc read Baine Muc. P. 132, Fanaisge maisge should be Fanaisge naisge. Magallin Meadbrach is better Magairlin Meadrac, *Orchis mascula*. Buidhe standing alone, should be Buidhe Bhailscean, *Senecio jacobaea*. Corranlin, Cluanlin, Cabrois identified as *Spergula arvensis* not *Lysimachia vulgaris*. Gear neimh *Euphorbia peplus*. For *Prunus communis* read *Prunus spinosa*. *Prunus malus* crabapple should of course be *Pyrus malus*. Blaith na mbodager should be Blaith na mbod-agh. Canleach dhearg is better Canleac dearg. Cabhan abhan is *Nuphar lutea*, yellow water-lily.—*John H. Barbour, Ballyholme, Bangor, Ireland.*

TEUCRIUM BOTRYS.—Until 1894, this rare British plant was considered to be restricted to a few localities in Surrey, when its discovery near Halling extended its distribution into Kent. During last year I found it growing in a certain station in Surrey, which, although not so well known as the Box Hill localities, is, I believe, the one where it was first found in Surrey; a fact that was lost sight of for years. When seen in June, 1898, it appeared to be plentiful over the limited area on which it occurs, but, on a visit to the same place later in the year, the plant did not occur to such an extent as to be described as abundant. However, this year, I was pleased to see the plants were quite plentiful. Mature examples and seedlings were thick in places, and the species had even invaded the copse on the summit of the slope. Judging from the appearance of the larger specimens these seemed to have remained over from the previous year, so that the species is probably both annual and biennial. This was in mid-July, and it seemed unlikely that the seedling plants would attain maturity in the same year, especially, as in the previous year, by late August, the species here was almost past flowering. There are points in connection with the accounts of this plant that seem open to correction, one being, the flowers are described as many. The larger plants noted by me bore nearly 400 flowers each, so the term many does not seem to indicate how very numerous the flowers really are. In regard to its status, *Teucrium botrys* is usually designated a colonist, a plant found only on land adapted by man for its growth, and continuous maintenance. In the locality I refer to, it is certainly not a colonist, as it is confined to a slope that shows no signs of past cultivation, and is at present much excavated by rabbits. This situation may be a portion of down country that has escaped cultivation, like other small portions hereabouts, and must be much like the Halling locality. A curious circumstance in connection with plants gathered at this spot last year, was the number of flowers producing no fruit; due to the fact of having been partially gnawed away by animals. Whether this mischievous work was caused by bees, snails, or rabbits it was impossible to judge, and no other parts of the plants showed any signs of this treatment. It occurred to me as likely that the flowers had been bitten away by bees, anxious to save themselves the trouble of securing the honey in the orthodox manner; but, as the pistil, in most cases, had suffered equally with the other members, this seemed rather against the idea that bees were the offenders. One plant had as many as 97 flowers injured in this manner, consequently producing no seed, and another bore 51 similar flowers. If this injury to the flowers of this very rare plant is a not unusual circumstance, it is likely to have a decided influence in checking the natural increase and spread of *Teucrium botrys* in that neighbourhood.—*C. E. Britton, 35, Dugdale Street, Camberwell, S.E.*

CERATOPHYLLUM DEMERSUM IN NORFOLK.—Through the courtesy of two correspondents, Mr. Arthur Bennet, of Croydon, and Mr. H. D. Geldert, of Norwich, the information has reached me that this segregate, mentioned in my notes (*ante* page 166), as well as *C. submersum* L., have been recorded for both the Watsonian provinces of Norfolk. The records appear in the Rev. Kirby Trimmer's "Flora of Norfolk," 1866, and also in the supplement of a more recent date.—*J. Saunders, Luton.*

POISONOUS PROPERTIES OF YEW.—We are somewhat surprised that the "Times" newspaper should be able to spare space at this busy season of journalism, for a discussion on the poisonous properties of the yew tree. It is the privilege of the "Times" to be the most varied newspaper in the world: and no matter how important may be the event of the previous day, the literary side is always ample, excellent, and accurate. This subject under discussion, however, has been well threshed out long ago. The leaves and young branches of yew are poisonous, and possibly the seeds also, if crushed before entering the alimentary canal, but if unbroken they appear to be harmless. The pulp of the fruit is harmless.



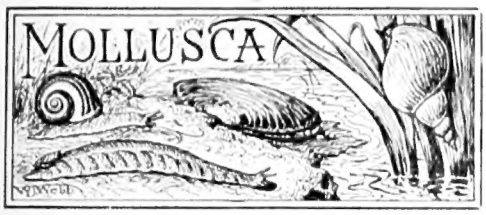
CONDUCTED BY EDWARD A. MARTIN, F.G.S.

To Geological Exchangers.—It is proposed to hold a meeting once a month, at the offices of Science-Gossip, 110, Strand, London, of those of our geological readers, who wish to exchange specimens. This will afford opportunity to arrange exchanges personally, without the trouble and expense of packing and postage. The dates of the meetings for the next four months will be December 6th, January 10th, February 7th, and March 7th. The Departmental Editor for Geology will be present between 5 p.m. and 7 p.m., and it is hoped that geologists will come with their specimens. The geological books in the library are available for loan to the readers attending.—[Editor, Science-Gossip.]

The Surrey Bourne.—Much of the water supply of Croydon is drawn from springs which rise in the middle of the town, and this supply is assisted by the intermittent stream known as the Bourne. The rising of the Bourne was, previous to the building of the culvert in 1850, the cause of inundations in the lower parts of the town. The stream was very voluminous in the years 1841, 1852, 1866, and 1873. At the last-named period the rise was particularly high, and on the 7th February two and a half million gallons entered the culvert, whilst the outflow was no less than $9\frac{3}{4}$ million gallons. It has been estimated that one of these periodical risings of the Bourne takes place in February of the year, following that in which the local rainfall exceeds 30 inches. The Croydon water supply is augmented by a reservoir in the chalk at the Addington Hills, and also by the bore-hole recently sunk at Waddon. Another boring is now being made into the chalk at Woodside.—*E. A. Martin.*

Striae as Evidence of Ice-Action.—Mr. Martin has done well to direct attention (*ante*, p. 158) to the mischievous old theory that striae upon rocks are evidence of ice-action. As a matter of fact, they are evidence of nothing at all, except the inroads of the weather, lichens, etc. No doubt we all remember attending so-called geological lectures in our young days, and we still carry pleasant reminiscences of the exhibition thereat of a slab of sandstone from the sea-shore grooved with ripple marks. These the rhetorical lecturer unhesitatingly referred to the action of the seas of some antediluvian period. The idea that this regular and beautiful grooving was wrought so very long since, is calculated to excite a poetical feeling, akin to that which arises when some delicate striae on rock surfaces are attributed to a glacial agency operative many centuries ago. For instance, the grand rocks edging the valley where the Derwent-water reposes have been found carved and grooved with striae, all pointing in the same direction. The bright poetical imagination of the late Mr. Ward was satisfied with nothing less than a monster glacier filling up the valley, and moving slowly northwards, chiselling the adjacent hills as it passed. His "Dream on Skiddaw" is worthy of the poetical land where his geological work was so vigorously carried on. In all these cases, the "glacial nightmare" is much enhanced in effect by the chance discovery of an apparently outlying boulder, or a perched block, picturesquely situated.—*Dr. P. Q. Keegan, Patterdale, Westmoreland.*

Sandstone Tubes.—To my mind, the origin of these tubes (S.-G., *ante*, p. 189) usually given, will not explain all the conditions, so I append an abstract of my paper on "Tubular and Concentric Concretions," read in Section C. British Association, Dover meeting, 1899: "After excluding stalactites and pseudomorphs from the list of tubular concretionary bodies, there yet remain a remarkable series of rings and cylinders which afford no obvious explanation of their existence. They consist chiefly of lime, silica, and iron, and no other substances appear to possess this peculiar property. It seems also to be a rule for these bodies to occasionally exhibit concentric arrangement. A recent instance of this re-deposit of material is very frequent in weathered mortar, whether used as a cement for sandstone, limestone, or igneous rocks. So far, I have never failed to discover examples of this in whatever town or village I have searched. Both in Dolomite and Oolite beds, at Fulwell, Cresswell Crags, and Isle of Portland, tubes and channels, often concentrically arranged, are to be met with quite distinct from ordinary drainage channels. These are probably due to the same influence, an hydrostatic or mechanical one, which causes the segregation in the mixture of sand and lime used as mortar. The cone-in-cone rings seen in coal from Merthyr Tydvil may be due to the same selective power or growth, for, from an analysis made for me by Mr. E. T. Andrews, they contain lime and alumina in about equal parts. Both flint paramoudra and the flint circles near Cromer should, in my opinion, come under this division of concretionary bodies, and no longer be supposed to be fossil sponges. Beekite, the geodes from Uruguay, and the variety of agate with 'eyes,' afford innumerable examples of annular formation, differing in arrangement from the mortar only by the smaller size of the circles. Both chalcedony and opal must be recognised as possessing this power to produce circles and 'fortifications' on *flat* surfaces, quite irrespective of the contour lines of the cavities in which the agates are formed. Iron cylinders in the Folkestone beds of the Lower Greensand exist in large numbers as single tubes, clusters and concentric tubes. As yet, I believe, no one has found in any signs of organic remains in association with them. In all probability they are due, like the other instances mentioned, to some special arrangement or concentration of solutions in the beds. They are met with to a smaller extent in the Trias, near Exeter, the Wealden of the south-east of England and other rock beds. They give little, perhaps no evidence of pressure, and are generally found in horizontal positions, so cannot be supposed to be stalactitic. The actual cause or origin of these formations is not very clear. We may call it segregation, but this does not carry us far. Whilst further study may add to our knowledge of the influences which favour their growth, we may be just as ignorant as to why they grow as the crystallographers are of the similar processes in crystals. I surmise, however, that we shall ultimately find that some hydrostatic influence will explain much that is at present both mysterious and perplexing, or that amorphous matter has learned the 'trick,' like crystals, of forming definite shapes. I showed a considerable number of these concretions from different beds, at the recent Soiree of the Geological Association."—*Geo. Abbott, M.R.C.S., Tunbridge Wells.*



CONDUCTED BY WILFRED MARK WEBB, F.L.S.

A NEW PULMONATE GENUS.—Mr. Henry A. Pilsbry has communicated a paper to the Malacological Society of London upon a new genus of dark-bearing Helicidae, which he calls *Metastracon*, the members of which are slug-like.

HELIX ASPERSA var. EXALBIDA.—Mr. Carrington's remarks under this heading (*ante*, p. 181) have given rise to the two following notes, which do not exactly agree. The Rev. J. W. Horsley, writing from St. Peter's Rectory, Walworth, says:—"You need not have had any doubt as to the accuracy of Mr. L. Adam's statement that the var. *exalbida* of *H. aspersa* was 'not uncommon where it occurs, especially in Kent.' Near Shepherdswell I have found dozens in one hedge, and in another near Alkham, they are numerous enough to cause, by breeding with var. *zonata* and var. *grisea* some pretty variations. In fact, in the latter place the typical *aspersa* is less frequent than its varieties and variations, especially the band formulas 10005 and 10305."

Mr. J. E. Cooper, of Highgate, writes:—"My experience does not quite coincide with Mr. Carrington's as regards this variety. I have found fifteen or sixteen in one spot near Walmer; about half-a-dozen scattered over the hedges between Betchworth and Dorking; two at Woolacombe Bay, North Devon; and a single example on the sandhills near Sandwich. *Pyramidula rotundata*, var. *alba*, also usually occurs very sparingly, though I know one spot, near Ilfracombe, where the variety far outnumbers the type."

SNAILS AS HEALERS OF WOUNDS.—The silvery trails that mark the line of route taken by our land-snails and slugs in their journeyings, are familiar enough. A use has, however, been made of the mucous which the common snail (*Helix aspersa*) leaves behind, that may have escaped record. Just twenty years ago when the writer was a small boy at St. Marylebone, All Souls' Grammar School, in Baker Street, he saw in that road two funny old men. They carried under their arms cloth covered cases that closed up like some chess boards, and formed, when opened, two trays. In these were a fair number of snails actively crawling about, as was discovered shortly afterwards, when the old men came to a halt for the purposes of doing a little business. Their stock-in-trade included also some pieces of thick paper of a spongy character, in colour and texture very much resembling what is called straw-board. The complete performance was to allow a snail to crawl over a piece of the paper, and then to sell it for a penny to any person who had lost a fragment of skin, and who would pay the price. The prepared paper had, of course, to be applied to the damaged place, and according to the old men, would cause it to heal rapidly. So far as one can remember, there was not any great demand, though the very novelty of the idea brought a few customers. Whether the notion was an old one, the writer has not discovered.—*Wilfred Mark Webb.*

BELFAST NATURALISTS' FIELD CLUB.—The annual conversazione was held in the Public Library and Art Gallery on 1st November. There were numerous exhibits in the departments of geology, zoology, botany, ethnology, archaeology, microscopy, and photography, many being of exceptional interest. Mr. J. H. Davis showed freshly-gathered mosses in fruit, also dried specimens of *Poa compressa* from old walls at Lisburn; Mr. Moore, of the Royal Botanical Gardens, Dublin, a number of tropical yams; Mr. R. May, Irish elk remains; Mr. G. P. Farran, blind shrimps from Dublin pump wells; Mr. H. L. Orr, Irish land and freshwater shells; Mr. R. Welch, a fine series of freshwater shells from the Ulster lakes, and other Irish land and freshwater shells, with some from Lake Tanganyika, also ancestral types of recent marine shells. In the department of archaeology, Mr. F. J. Bigger, M.R.I.A., showed rubbings of armorial stones in County Antrim, and Mr. W. Swanston, F.G.S., some ancient maps of Ireland from the 16th to 18th centuries. Altogether, including the President's address, the conversazione was most successful.

SELBORNE SOCIETY.—The council of the Selborne Society have arranged a series of evening lectures to be given on the third Tuesday in each month during the winter. The first one took place at Morley Hall, Hanover Square, London, on the 21st Nov., at 8.30. Professor Henslow gave the inaugural lecture, his subject being, "Plants and their Surroundings." The chair was occupied by Sir Robert Hunter. The remaining lectures of the series include Mr. Fred Enoch, Professor Boulger and, it is hoped, by Sir John Scott-Montague, and Sir John Lubbock, the Society's President. In order to continue the good work of the Society's Field Club, and to give its members a chance of seeing each other during the winter months, the two lady members of the council, Mrs. Myles and Mrs. Wilfred Durrant, have arranged a monthly meeting on the second Saturday in each winter month. The first one took place at the Natural History Museum, Kensington, on Saturday afternoon, the 11th November, under the guidance of Professor Boulger, F.L.S., F.G.S. The party inspected the botanical examples and diagrams.—*E. T. Durrant.*

GEOLOGISTS' ASSOCIATION.—A conversazione of the Association was held at University College on the 3rd of November. There was an interesting exhibition of specimens. Dr. G. Abbott showed a variety of concretions in lime, iron, and silica, including coral-like forms from Fulwell, Durham; Mr. A. E. Salter, erratic igneous rocks from the Lea Valley, Cromer, and other parts of East Anglia. Some fine chalk fossils were exhibited by Mr. G. E. Dibley, amongst them being a specimen of *Hippurites* from near Rochester, and *Goniaster* in calcite, imbedded in a flint. The Rev. Prof. T. G. Bonney showed "Dreikanten" (wind-worn stones) from Egypt and New Zealand, and schistose Jurassic rocks with minerals mistaken for garnets and staurolites, etc., from the Alp.

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.*

Irish Plant Names.

To the Editor of SCIENCE-GOSSIP.

Sir,—It appears that your Correspondence Page, the new feature of Science-Gossip, is being taken full advantage of, and it is certainly most pleasant to see correspondence on interesting subjects going on among your readers. Especially is it so to me, as I am enabled to reply to "Inis Fail's" letter on Irish Plant Names.

In the first place, allow me to thank him for the interest he has shown in my article (*ante*, p. 130), and for the suggestions which he is good enough to give. I would ask him before going further, to notice the few notes I have made in this month's number of your paper, written before I received my November Science-Gossip; and I may add that I hope to carry out the suggestion of translating some of the Irish words, possibly early next year. Referring to an alphabetical list, several suggestions have been made as to the best way of dealing with it. One is, that I should follow the classification adopted by the "London Catalogue" of British plants, and arrange the names in such an order; another, that I should adopt the classification used in the "Cybele Hibernica," as the plants are Irish.

With regard to the letter from "Inis Fail" Sighe (p. 131 and 132) is correct, so far as I am aware, and Sighe is synonomous with Sithe, fairy. I am sure "Inis Fail" knows that the spelling of Irish words varies somewhat, and that is how we may have both words meaning the same thing, which is what he suggests, "fairy's glove."

Why Cran—a tree, should be specially applied to the maple I cannot say, but may add that Cran Maplais also signifies the maple.

It is not Span, but Slan lus which is the Irish for plantain; but supposing the word were Span, it would apply, because this plant has power to stop bleeding, a virtue which resides in its leaves.

Both Seamrog and Seamsog are right, the word is sometimes spelt one way and sometimes the other.

I notice what "Inis Fail" says about omissions. There are many Irish names left out of my list, but some of them I only found out, since the article was written, and I hope when next space can be spared, to considerably increase my former list, with the aid of your correspondent and that of others of your readers who can help.

Bangor, Co. Down. John H. Barbour.

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.

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.

Notice.—Contributors are requested to strictly observe the following rules. All contributions must be *clearly* written on one side of the paper only. Words intended to be printed in *italics* should be marked under with a single line. Generic names must be given in full, excepting where used immediately before. Capitals may only be used for generic, and not specific names. Scientific names and names of places to be written in round hand.

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

NOTICES OF SOCIETIES.

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

Geological Society of London.

Dec. 1.—†The Zones of White Chalk on English Coasts. Dr. A. W. Rowe, F.G.S.
New Rhaetic Section at Bristol. W. H. Wickes.
Percy Emary, Hon. Sec.

North London Natural History Society.

Dec. 7.—†Debate. Are Acquired Characters inheritable?
,, 21.—†Annual Meeting.

Tunbridge Wells Natural History and Philosophical Society.

Dec. 1.—†Some Facts about Birds. Miss Turner.
,, 8.—§The Eternal Stars. Sir R. Ball, F.R.S.
,, 9.—§Time and Tide. Sir R. Ball, F.R.S.
,, 15.—†Dawn of Economic Science. A. T. Shearman, M.A.

Lambeth Field Club.

Dec. 4.—Fire. Miss A. L. Hodson.
,, 9.—*Nat. Hist. Collections. St. George's Library, Buckingham Palace Road.
,, 18.—Astronomy of the month. H. Wilson.

Limerick Field Club.

Dec. 12.—†"Archaeology." Rev. Timothy Lee, Adm. M.R.S.A.I.
Francis Neale, Hon. Sec., Limerick.

Preston Scientific Society.

Dec. 13.—Conversazione.
Sectional Meetings are also held at 119, Fishergate, 8 p.m., on Dec. 1, 2, 4, 5, 6, 7, 8, 11, 12, 14, 18, 19, 20, 21.

South London Entomological and Natural History Society.

Dec. 14.—†Meteorites. John T. Carrington.
Stanley Edwards, Hon. Sec., Hibernia Chambers, S.E.

Hull Scientific and Field Naturalists' Club.

Dec. 13.—†Of Planetary Motion. J. A. Ridgway.
T. Sheppard, Hon. Sec., 78, Sherburn Street.

Selborne Society Field Club.

Dec. 9.—Westminster Abbey; 2—4 p.m. Stanley Austin.

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.

Spiders Wanted.—In view of the series of articles on British Spiders now appearing in Science-Gossip, the Editor appeals to Field Naturalists to save and send to the author, Mr. Frank P. Smith, 15, Cloudesley Place, Islington, N., any specimens they may meet with. Mr. Smith will make the best return possible for the material. Full instructions for collecting Spiders appear in this number on page 195.

Wanted, good specimens Trilobites, Fossil Ferns, or Oolitis Echinoderms, in exchange for characteristic Cretaceous Fossils. Write, stating species and condition, to Edward R. Swales, 43, Cheriton Road, Folkestone.

Wanted, a few living Testacella sentulum, also some of the rarer British Vertigos.—J. E. Cooper, 68, North Hill, Highgate, N.

Wanted, ½-plate camera. Will exchange latest treadle fretwork machine; every improvement; cost £3 10*s*.; also 50*s*. worth of fretwood.—J. Brown, Rosemount, 80B, Church Lane, Old Charlton, S.E.

Wanted to purchase or exchange, to value, Wm. Smith's Synopsis of British Diatomaceæ, 2 vols., 1853-1856.—M. H. Stiles, Doncaster.

Northern Scenery—Will exchange prints of, for photo-micrographic botanical, zoological, etc., prints. — A. Nicholson, Carlton House, Greenbank, Darlington.

Offered—Good micro-slides in exchange for others, or for books on diatoms.—J. Ferguson, 41, Melrose Gardens, Shepherds' Bush, W.

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