

## Research Items.

WITCHCRAFT IN SOUTHERN INDIA.—In *Man* for March, Mr. F. J. Richards publishes photographs of houses in Arantāngi, Tanjore, which have been demolished by their owners in their fear of 'black magic.' On the occasion of a visit to the village in 1900 he found the Brahmans in a panic, stripping the thatch from the roofs of their houses and removing their belongings into the street. On the previous night no less than seven houses had been set on fire by supernatural agency, and the whole Brahmin quarter had been pelted with stones thrown by invisible hands. Stone-throwing continued in broad daylight, and when another fire broke out the householder brought to the author a rag ball a little bigger than a tennis ball which had been found under the eaves. Tow and rag had been rolled tightly together. It was damp and was said to smell of phosphorous, though this was not perceptible. In the centre was a small fruit stone—held by the villagers to be conclusive evidence of sorcery. The kitchens were desecrated with blobs of boiled rice, coloured yellow or magenta, and mixed with clippings of human hair and nail parings. These were found secreted in and about the cooking places. This defilement of places of which the ceremonial cleanliness is of the utmost importance, was especially to be noted. The Brahmin quarter was the residence of the most intelligent and prosperous section of the village. It was suggested that blackmail was the origin of the visitation. Some professed expert in sorcery had demanded a contribution from each household and had been refused. This was his retaliation.

A PILE-DWELLING AT BRENTFORD.—In *Antiquity* for March, Dr. R. E. M. Wheeler describes some investigations recently carried out on the foreshore and in the bed of the Thames at Brentford. In 1928 public attention was attracted by the frequency with which bronze weapons and implements were found in the neighbourhood, and especially near the meadow "Old England" just above the junction of the Thames and the Brent, particularly through the collections made by Mr. G. F. I. Lawrence. Mr. O. G. S. Crawford has suggested that this may be the site of one of a number of settlements of lake-dwelling peoples from Switzerland of the late Hallstatt Iron Age. A fund was raised for excavation through the *Daily Express*. The result was the discovery of a Romano-British pile-dwelling—the first of the period recorded in the British Isles. As the excavations were below tide level, they were carried out under great difficulty and only part of the site was uncovered. This, however, was sufficient to indicate the existence of a rectangular dwelling. Piles were found in position with part of the floor of the hut. The first indication of the date of the structure was a complete Roman pot found above this floor. The structure of the floor was as follows: A pile was driven more than three feet into the gravel—how much more it is impossible to say; a horizontal beam was laid on the pile on the level of the gravel; then a layer of green clay was laid on the gravel to the height of the beam—6-7 inches. Upon this was laid a longitudinal layer of wattle. Upon this was a second horizontal timber and then a further layer of clay. A double layer of wattle formed the final floor, nearly 2 feet above the gravel. The timbers were unsquared. A Roman roofing tile beneath the wattle floor in the upper layer indicated the period. Roman pottery and roofing tiles were found around the hut. In the surface of the gravel, fragments of coarse pottery were found which can with confidence be assigned to the half millennium 1000-500 B.C., known in Central Europe as 'Hallstadt.'

PHOTOSYNTHESIS IN THE SEA.—The Annual Report for 1927-28, drawn up by the executive to the council of the Scottish Marine Biological Association, shows a satisfactory financial situation, the greater part of the expenses of the marine research being defrayed by the Development Fund of H.M. Treasury, together with an amount contributed from local sources. Miss S. Marshall and Mr. A. P. Orr having been granted leave of absence in order to join the Great Barrier Reef Expedition, temporary appointments have been made to fill their places. Before leaving, their researches on photosynthesis in the sea had been continued, including further experiments on diatom cultures enclosed in glass bottles suspended at different depths in the sea, the oxygen produced being measured. From the results it was concluded that the light intensity at which photosynthesis just balances respiration in these in-shore waters is never deeper than 20-30 metres even in summer. As the surface is approached the increasing light enables more photosynthesis to take place, but this increase only goes up to a certain depth, above which the light is too strong. During the spring maximum the diatoms are so numerous that they shut off a considerable amount of light and the compensation point rises. Different species behave in different ways. The members of the genus *Chaetoceros*, summer forms in these regions, were found to be more sensitive to sunshine than those of *Coscinodiscus*, which are chiefly spring forms, both in cultures and naturally in the sea. Two papers have been published by these authors in the *Journal of the Marine Biological Association* in 1927 and 1928, "The Relation of the Plankton to some Chemical and Physical Factors in the Clyde Sea Area" and "The Photosynthesis of Diatom-Cultures in the Sea."

DECAPODA OF THE *SIBOGA* EXPEDITION.—Dr. J. G. De Man has continued his studies of the rich material of the *Siboga* expedition, his latest report dealing with the Thalassinidæ and Callianassidæ (*Siboga* Expedition. Monog. 39 a6, Leyden, December 1928). This report, which amounts to a partial monograph of the group, gains particular value from the list of species known in each genus and the tables for their identification. The *Siboga* material includes 10 species of *Upogebia*, of which 5 are new, and 15 of *Callianassa*, of which 12 are new. This large proportion of new species shows how little these burrowing forms are known. Dr. De Man illustrates this point by saying that, out of 76 species of *Callianassa* described, 46 have not been seen since their description. No one to this day knows the manner of life of *Jaxea nocturna*, which has been known since 1818. Its larva is commonly met with on the coasts of Britain, but the adult has been taken only twice. There is one omission from this report which is difficult to understand—*Naushonia crangonoides*. In one of his earlier reports, Dr. De Man includes it among the Crangonidæ, but he does not mention it here at all. There is no doubt whatever that it is not a crangonid but a thalassinid, and it is almost certain that it is closely related to *Jaxea*. The author does not enter into the question of the phylogeny and systematic position of these remarkable and probably very ancient Decapoda; but his extraordinarily detailed description of the species will be valuable material with which to build. The last word has certainly not been said as to the position of the Thalassinidea among the decapods or their relation to one another.

A JAPANESE OLIGOCHÆTE.—Mr. Hironori Yoshizawa gives an interesting and detailed description of

the freshwater oligochaete *Stylaria lacustris* which is very common in the pond of the Biological Laboratory, Tôhoku Imperial University ("On the Aquatic Oligochaete *Stylaria lacustris* L." *Science Reports of the Tôhoku Imperial University*, 4th Series (Biology), Sendai, Japan, vol. 3, No. 4, Fasc. 1, 1928). The worm is remarkable in having an elongated prostomium. It was cultured in the laboratory, the cultured specimens being used for the present work. These all attained sexual maturity in early autumn, September and October being the natural time for the sexual form in the pond. The food consists of diatoms, other algae and vegetable debris. One of its enemies is *Hydra*, which swallows the worm, helping it down with its tentacles (body length of the worm 8-11 mm.). This reminds one of *Protohydra*, which can swallow oligochaetes much longer than itself, and in that case with no tentacles at all. Asexual forms are found in spring. These are rather shorter and thinner than the sexual worms, and fission may take place in three or even in four places. The front portion forms a new tail by adding a number of posterior segments, and the hind portion adds five new segments anteriorly to form a new head. As a rule, fission proceeds from the ventral plane, midway between the anterior and posterior septa of the segment. There are usually twenty-five segments, 16, 17, 18, 19, and 20 being the segments which most frequently undergo fission.

LIVING FORAMINIFERA IN THE TRANSCASPIAN KARAKUM.—Up to now only a few marine Foraminifera have been found in fresh waters or in continental waters generally. Some marine genera (such as *Polystomella*, *Rotalia*) come up to river estuaries and small freshwater lakes by the sea. In the spring of 1927, A. L. Brodskii (*Priroda*, No. 11, 1928) found a numerous fauna of Foraminifera in the wells of the Kara-Kum desert. These wells lie north-east of Askhabad, their depth is 18-20 m., temperature of the water in spring is 17°-20° C., and in some cases the water contains as much as 10 gm. of salt per litre. The Foraminifera found in the wells belong to the genera *Spiroculina* (a new species *turcomanica*), *Biloculina* (*B. elongata* and a new species *turcomanica*), *Textularia*, *Nodosaria*, and *Lagena*. They all contained protoplasm, and in some a nucleus or nuclei were found; thus there can be no doubt that they were alive. All the Kara-Kum Foraminifera are very small in size; whilst the marine *Spiroculina* and *Biloculina* reach 2-3 mm. in length, the Kara-Kum representatives of the genera scarcely exceed 0.16 mm. Their shells are fragile, transparent, flattened, and smoothed. They evidently inhabit salty groundwaters of the sands of Kara-Kum desert, whence they fall into the wells. They are probably relics of the Upper Tertiary seas which once covered the Kara-Kum desert. Waters of the Sarmatian and the Akchaghyl seas may also have stretched up to there. It should be noted that *Polystomella*, *Rotalia*, *Textularia* are still found in the Caspian Sea. Masses of valves of *Polystomella* and *Discorbina* are found in the Aral Sea, and it is probable that Foraminifera live there now.

REVISION OF THE GENUS *TRIGONELLA*.—In his monograph on the genus *Trigonella*, G. Sirjaev proposes a new division of the genus into three subgenera, fifteen sections and numerous subsections. The first published part (*Publications de la Faculté des Sciences de l'Université Masaryk*, No. 102, 1928) deals with the taxonomy and distribution of twenty-one species of the chief subgenus *Trigonella*, one new species from Bokhara and several new varieties being described.

WATER METABOLISM IN DUSTY LEAVES.—With most plants the transpiration of dust-covered leaves is considerably lower than that of leaves which have been recently cleaned, so that after a few hours the former leaves will contain appreciably more water than the latter. An exception to this general rule, noted by Luigi Montemartini in the *Rendiconti* of the Royal Lombardy Scientific and Literary Institute (vol. 61, parts 11-15), is observed in the case of *Ceratonia siliqua* (L.). Here the cleansed leaves, although exhibiting a markedly more active transpiration, yet accumulate more water than those covered with a layer of road-dust. To explain this exceptional behaviour, reference is made to the fact that, as Bose showed, transpiration renders more active the circulation and ascent of water in plants, whereas diminution of the transparency and of the permeability to gases of the cuticle by the thin coating of dust determines a decreased production of substances able to retain moisture in the cells. It would seem that, with *Ceratonia* leaves, the cuticle presents peculiar features as regards this transparency and permeability and the cellular protoplasm a sensitiveness which, under the conditions employed, leads to a retardation of all the vital functions with consequent loss of water when the leaves are dust-covered.

CYTOLOGY OF *ÆNOTHERA*.—A useful summary of our knowledge of the cytology of *Ænothera* has been published by Prof. R. R. Gates in *Bibliographia Genetica*, 9, 401 (1928). It was in this genus that important correlations between chromosome content or behaviour and genetic phenomena were first discovered. Since the original announcement of chromosome numbers in *Ænothera* was made in December 1906, an enormous amount of research has been carried out on many of the species, mutations, and hybrids of wild and cultivated evening primroses, as is indicated by the bibliography of seven and a half pages attached to this paper, which summarises work up to 1923, with some references to subsequent publications. Chromosome numbers in 30 species are now known. The improvements in cytological technique in recent years have led to the demonstration of delicate connexions between the ends of the chromosomes, and these determine the peculiar alignment observed in the heterotypic metaphase. The meiotic process is certainly telosynaptic. The mutant *Æ. gigas* was the first investigated tetraploid mutation. The first examples of non-disjunction were also studied in this genus, and double non-disjunction is now known to occur. Trisomic mutations, with 15 chromosomes, are the most characteristic of all the mutations of *Ænothera* and include the well-known *Æ. lata*, *Æ. scintillans*, *Æ. oblonga*, and *Æ. albida*. The view that *Æ. lamarkiana* is, in spite of the numerous mutations it has thrown, a persistent species of equal value to *Æ. biennis* and others of the *Onagra* group, is maintained, though it is suggested that the whole group may be ultimately hybrid in origin. Indeed, it is accepted that hybridisation followed by new chromosome linkages and accompanied by mutations, some of them cytoplasmic and some arising in the chromatin, have been largely responsible for the evolution of the genus *Ænothera* as we now know it.

THE PARKGATE SEAM IN SOUTH YORKSHIRE.—The Department of Scientific and Industrial Research has issued the thirteenth of its physical and chemical surveys of the coal resources of Great Britain (London: H.M.S.O., 1929), being an investigation of the Parkgate Seam, which occurs over an extensive area in South Yorkshire and the adjoining parts of Nottinghamshire and Derbyshire. The seam is an exceedingly

important one and extensively worked throughout the whole area in question. In Derbyshire and Nottinghamshire it is spoken of as the Deep Hard, whilst in Yorkshire to the north of Barnsley it is known as Old Hards. The seam is generally considered as capable of being divided into three main sections, namely, the tops, the hards or middle coal, and the bottoms. Of these, the middle coal may be considered the most important; it consists very largely of durain. The method of investigation in the present report has been to cut some sixteen samples from the Parkgate seam as it occurs in South Yorkshire in the exposed portion of the coalfield, ranging from a little north of Barnsley to just south of Sheffield. These samples have then been fully examined, and the results of the examination are reported in detail; the determinations include approximate analysis, ultimate analysis, calorific value, melting point of ash, carbonisation assay, and ultimate and proximate analyses of the four constituents, vitrain, clarain, durain, and fusain. The work has been done not only on the whole sample, but also upon the various sections into which each sample could be divided, the sample consisting in every case of a vertical prism of the coal cut from the roof to the floor. When, as is sometimes the case, a certain portion of the top coal is left standing to form a roof, such portion has not been included in the sample. The report gives evidence of very thorough and careful investigation, and the results should be of value to those engaged in working this particular seam, that is to say, to practically all the collieries working in the area above indicated.

**A NEW WARM STAGE.**—An electrically heated warm stage and compressor for use with high-power objectives is described by Messrs. J. E. Barnard and F. V. Welch in the January issue of the *Journal of the Royal Microscopical Society*. The apparatus consists of a small box which encloses the heating system, the microscope stage and object holder, and also the objective and substage illuminator. The box is in two parts, one of which slides off the other and permits access to the object without disturbing the microscope or its adjustments. The two electrical heating elements are clamped on the under-side of the stage, one on each side of the condenser, and the leads to them connected to the mains in series with a suitable variable resistance. The temperature of the air inside the box is raised, and the stage and compressor can therefore be maintained at a constant temperature. As the compressor is a relatively large mass of metal, its temperature once raised changes little, and hence the two cover-glasses between which the material is placed for observation are also maintained at a constant temperature. The apparatus was designed for use in an investigation on bacteriophage action involving observations of living bacteria for long periods, and for this purpose has proved entirely satisfactory.

**ULTRA-VIOLET LIGHT TRANSMITTING GLASSES.**—An interesting paper by Starkie and Turner on the composition and properties of ultra-violet light transmitting glasses has appeared in the *Journal of the Society of Glass Technology*, vol. 12, No. 48. An account of the development of these glasses is given, together with some analyses. The limits of transmission in the ultra-violet and the percentage transmission have been studied for eight commercial ultra-violet glasses, and the results show a wide divergence for the different samples. The ageing effect of sunlight, known as solarisation, was examined, and an exposure of several months in summer was found to reduce the transmission by more than 10 per cent in some cases. Exposure to the light of a powerful arc for several hours brought about much more rapid ageing. This ageing is usually accompanied by a colour change from a greenish to a brownish tint, which supports

the theory of Starkie and Turner, that the dominating factor in solarisation is the conversion of ferrous to ferric oxide in the glass.

**THE MECHANISM OF ARCS.**—It seems now to be generally agreed that it is not necessary for the cathode of an arc to be hot for the discharge to pass. The problem therefore arises as to how the current is maintained, if it is not primarily due to thermions from the metal, and to meet this difficulty the suggestion has been made by Prof. Seeliger and by Dr. Langmuir that there is an 'autoelectronic' liberation of electrons from the surface of the cathode in the high electric fields that are present in the localised region of the cathode fall in potential. These fields can be of the order of a million volts per centimetre, and are ample to pull electrons out of a cold metal under appropriate conditions, such as those employed, for example, in the recently revived Lilienfeld type of X-ray bulbs. Unfortunately, this theory requires that the current density in the cathode spot should not fall below about 1000 amperes per sq. cm., whereas some arcs in gases at reduced pressure have been described by J. Slepian and E. J. Haverstick in the January issue of the *Physical Review* in which the current density was only about one per cent of this. It appears, then, that the field theory is not tenable, if its interpretation by these authors is correct, and they have again directed attention in the same paper to a theory proposed by one of them (J. Slepian) three years ago, which referred the maintenance of the arc not to any emission of electrons from the cathode at all, but to the thermal ionisation of a layer of gas in its immediate vicinity.

**RAMAN OPTICAL EFFECT.**—In spite of the attention that the quantised scattering of light discovered by Prof. Raman has already received, there are a number of points connected with it that are still obscure. Perhaps the most significant of these is the difference in intensity between the Raman satellites and the corresponding infra-red absorption bands and maxima of selective reflection. Quartz, for example, gives rise to Raman satellites equivalent to natural vibrations at 38  $\mu$ , 48  $\mu$ , and 78  $\mu$ , all of which were, until recently, unknown in the infra-red spectra. M. Czerny has now recorded the pair at 38  $\mu$  and 78  $\mu$  as absorption bands of crystalline quartz, using a grating apparatus (*Zeitschrift für Physik*, Feb. 19); he has, however, found not the slightest trace of a band at 48  $\mu$  in this way, although there is an intense Raman satellite corresponding to this wave-length. The origin of these discrepancies can only be surmised at present, but it may be, as the author suggests, that they arise from the fact that for a body to show the phenomena of selective reflection and absorption, the oscillators in it must have other properties than the mere possession of a definite period, whereas possibly the last condition alone suffices to produce a Raman satellite in scattered light.

**DETERMINATION OF TRACES OF IODINE IN VEGETABLES.**—McClendon and Remington, in the February number of the *Journal of the American Chemical Society*, describe a method for the estimation of small quantities of iodine in vegetables, depending on combustion in oxygen, the material being fed into a silica combustion tube by a special arrangement so as to avoid soot and tar formation. Chlorides and iodides volatilise and are condensed by electrostatic precipitation. Low temperature burning in open dishes requires about fifteen hours for 100 grams of dry sample, and does not lead to large losses of iodides if the ash is alkaline and the temperature never exceeds 450°. Calcium lactate must be added to vegetables with an acid ash (cereals) in order to make the ash alkaline and to prevent its fusion. Combustion is never complete if the ash fuses.