

## Research Items.

**CU-CHULAINN AND TOTEMISM.**—In *Man* for June, Dr. Géza Roheim, whose ingenious and suggestive psychoanalytic study of totemism in Australia has just been published in Great Britain, applies the same analytical method to the Cu-chulainn cycle of Irish legend with reference to its bearing upon the problem of totemic origins. Not only is the dog taboo of Cu-chulainn probably totemic, but also he becomes a dog by killing a dog. In other words, the legend contains more or less veiled references to the father-and-son conflict for the women of the Cyclopean family, from which, Freud holds, totemism and exogamy arose; of the animal symbol arising out of a feeling of guilt for the act of parricide; and of incest committed by the hero. Cu-chulainn slays the dog of Cu-lainn the smith, and serves in its stead, as other Aryan heroes served a term of apprenticeship with a smith, from whom they usually obtained their terrific weapon. But the smith and his dog are to be regarded as identical and the former represents the father. The slaying is therefore parricide. Cu-chulainn fights with and kills his own son; but Lugaid, who deals him his death-blow, is probably also his own son by an incestuous union, although ostensibly the son of Cu-roi. Cu-roi, the archaic form of the Oak King, is also to be regarded as the father of Cu-chulainn by whom he is killed. If then the smith is equated with his hound, the combat is between two heroes of the dog clan, and when Cu-chulainn breaks the taboo he is slain by his son Lugaid, a parallel being the case of the Baja King, who eats his totem animal when death at the hand of his son and heir draws near.

**MORPHOLOGICAL DIFFERENTIATION OF BACILLUS TYPHOSUS.**—L. Nicholls and E. Burgess direct attention in the *Ceylon Journ. of Science*, Sect. D (Medical Sc.), vol. i. pt. 2, 1925, p. 47, to the discrepancies which occur in text-books between the sizes given in the text and the magnifications stated under the illustrations respecting certain micro-organisms. They believe that were more attention given to the accurate comparison of the size and morphology of different organisms, much help would be derived for purposes of differentiation and identification. As an example, they have compared the morphology of *B. typhosus* with that of 40 other bacilli isolated from water. The organisms were grown on three standard media: (1) ordinary nutrient agar, (2) salt (3 per cent.) nutrient agar, and (3) salt-free peptone agar. Stained preparations were made and photographed under similar conditions. It was found that the *B. typhosus* could be distinguished almost at a glance from any one of these 40 water organisms by its characters when grown on these media. As regards the 40 water organisms, these corresponded morphologically to about 30 species, which agreed well with the results obtained by an extended series of culture and fermentation tests.

**THE BRITISH FRESHWATER PEARL MUSSEL.**—Considering that it is still an article of economic value, although less so than formerly, it is remarkable how imperfect is our knowledge of the life-history of the British freshwater pearl mussel. What is known has been admirably summarised by Mr. J. Wilfrid Jackson, of the Manchester Museum, in the introduction to his address to the Conchological Society on "The distribution of *Margaritana margaritifera* in the British Isles" (*Journ. of Conch.*, 17, No. 7), a paper all the more valuable on account of the numerous references to original sources of information. The mollusc has a remarkably wide circumpolar distribution, and

exhibits persistent specific characters. Nevertheless, although the glochidial stage is known, the transitional stages between that and the adult are unknown and unrepresented in collections save for four young shells, in Mr. Jackson's own possession, coming from the River Conway. What the habitat of the young shells may be is at present a mystery (cf. Prof. A. E. Boycott in *NATURE*, August 23, 1924, p. 276). One would infer that they resort to deep water, since in shallow they would have been found long ere this. At the same time it should be observed, although not emphasised by Mr. Jackson, that these young shells might easily be mistaken for the juveniles of a species of *Unio*, because they are not black like the adult, nor do they exhibit the characteristic concavity of the ventral margin, whilst they are furnished with a complete set of hinge teeth similar to those of *Unio*. The assertion has been made by Dr. Haas that *Margaritana* (or, as it should be called, *Margaritifera*) is intolerant of hard water, and certainly it obviously shows a preference for soft waters, which makes it difficult to explain the markedly thick shells of the species. Prof. Boycott's appendix to Mr. Jackson's address, however, shows that this question evidently requires further investigation. A very full account of the distribution of the single British species, accompanied by a most instructive map, forms the conclusion rather than the bulk of the author's very valuable paper, to which we are glad to note there is to be a second part dealing with the past history of the mollusc.

**RED CLOVER.**—Critical studies on the pollination, fertilisation, and breeding of red clover have led to conclusions of practical importance to agriculturists (R. D. Williams, Welsh Plant Breeding Station Publications, Series H, No. 4). Under ordinary conditions red clover is not self-fertilised, but a small number of plants are self-fertile if artificially self-pollinated, individual plants varying in the degree to which they are capable of this. The property of self-fertility is probably inheritable, and is greatly increased if pollination is effected before the flowers open, but so little seed is produced that it is doubtful if self-pollination can be of much practical use in the breeding of red clover. Humble bees are the chief agents in effecting cross-pollination at Aberystwyth and in Montgomeryshire, honey bees playing but a very small part. Six species of humble bees were observed on red clover, *B. agrorum* and *B. hortorum* being by far the most numerous and important, probably being responsible for 70 to 80 per cent. of the total yield of clover seed in these districts. The seed yields are to some extent reduced by robber bees *B. terrestris* and *B. lucorum*, and it is suggested that their depredations might be reduced by growing small areas of *Vicia villosa* near the clover, as this is a most attractive bait for these insects. As the bees are most abundant in early August, the yield of seed is much increased if the flowering of the clover is postponed until that time by means of judicious cutting of early strains or by growing late flowering strains. Larger yields might be obtained if more bees were available, and investigations are in hand with the view of increasing their numbers by judicious encouragement. Various methods of artificially breeding red clover have been tried, hand cross-pollination and controlled cross-pollination by humble bees being the two most promising methods of attack. Hand pollination is useless when many seeds are required or several plants are being intercrossed, but humble bees confined in various types of cages prove to be

very efficient agents, especially *B. agrorum*, *B. horiorum*, and *B. heliferanus*.

**PRODUCTION OF ALCOHOL FOR MOTOR FUEL IN THE TROPICS.**—The question of making an efficient motor fuel in the tropics, where imported spirit is expensive, is at present attracting considerable attention. Various materials have been suggested, and in some cases tried, as a source of power alcohol, such as starch-containing roots, and cellulosic residues from the sugar and other industries, but one of the most valuable appears to be the sap which may be collected from the flowering shoots of the Nipa palm of the Far East. Considerable work has been done in the Philippine Islands in ascertaining the suitability of this palm for the production of alcohol, and quite recently an experimental plant has been erected in the State of North Borneo. The plant is being run under the direction of the local Department of Agriculture, and an account of the results of the first year's working, based on a memorandum supplied by the British North Borneo Company, is given in the current issue of the *Bulletin of the Imperial Institute*, published by Mr. John Murray. There are about 300,000 acres of Nipa palm in North Borneo, occurring in nearly solid stands of 5000 acres or more. The sap flows for only six months in the year, but it is estimated that during this period 900,000,000 gallons of sap capable of producing nearly 60,000,000 gallons of alcohol could be obtained. The results of the first year's working of the experimental plant came up to expectations in every way. The still was only capable of producing 100 gallons of alcohol per working day of 12 hours, and the costs of running such a small plant were naturally somewhat high, but it is shown that a permanent plant producing not less than 1000 gallons per day should prove a commercial success.

**FORMATION OF MALACHITE.**—The May issue of the *Journal of the Chemical Society* contains a paper on the mechanism of the formation of malachite ( $2\text{CuO}$ ,  $\text{CO}_2$ ) from basic copper carbonate, by J. R. I. Hepburn. At ordinary temperatures the transformation appears to be caused through the intermediate agency of an aqueous solution of carbon dioxide or sodium hydrogen carbonate. In the former case normal malachite crystals are formed; in the latter, spherocrystals are produced, probably through crystal growth in a colloid medium (unchanged basic copper carbonate). Gelatin retards the change. The formation of malachite at  $100^\circ$  (by thermal decomposition of the blue solutions prepared by dissolving the basic carbonate in saturated sodium hydrogen carbonate) occurs as a surface film of interpenetrating spherocrystals, which is disrupted into individual crystals on further boiling. The direct cause of the change is attributed to loss of carbon dioxide from the sodium hydrogen carbonate at  $100^\circ$  with formation of the stable double salt  $\text{Na}_2\text{CO}_3$ ,  $\text{NaHCO}_3$ ,  $2\text{H}_2\text{O}$  and malachite. Gelatin likewise retards this change.

**THE SODIUM SPECTRUM.**—The July issue of the *Philosophical Magazine* contains a short communication from Prof. F. H. Newman, describing a successful attempt to obtain the spectral lines of sodium vapour due to changes of orbit involving less energy than that necessary for ionisation. The sodium vapour was contained in a triode tube of quartz maintained at  $350^\circ\text{C}$ . in an electric furnace. The electrons were supplied by a dull tungsten filament, and between the filament and the grid an increasing electromotive force was applied, the spectrum produced being photographed by means of a quartz spectrograph. After applying a correction of 0.4 volt to the observed potential to get the potential corresponding to the

energy with which the electrons pass through the grid, the author found that, in accordance with theory, at 2.2 volts the doublet 5896-90 only appeared, at 4.0 volts the doublet 3303-2, at 4.4 volts the doublet 6161-54, and at 4.6 volts the doublet 5688-3 appeared in addition.

**MASS OF COMPOUNDS OF SILVER WHEN STRONGLY ILLUMINATED.**—Messrs. P. P. Koch and B. Kreis describe, in the *Zeitschrift für Physik* of May 16, measurements made on particles of silver bromide and silver chloride, the mass of which was about  $10^{-11}$  gr. The particles were made to float in air in the electrostatic field of a condenser, in which they were observed by means of a microscope. The particles were strongly illuminated by means of an arc lamp and a powerful condenser; the mass being determined before and after illumination by means of measurements of the condenser voltage and of the charge of the suspended particle. The intensity of illumination employed was so high as  $67 \times 10^6$  metre candles; and it was found that in a short time the loss of mass was so great as 25 per cent. This loss appears to be due to separation of the halogens. Silver iodide under the same conditions showed only very small alterations in mass. The apparatus may be regarded as a very sensitive microbalance, in which particles of the same order of size as those in a photographic plate can be weighed, and the theory of photographic action can be directly tested.

**LOUD-SPEAKERS.**—The Marconiphone Co., Ltd., of Marconi House, Strand, now manufacture a loud-speaker which enables anyone to address an audience of many thousands and at the same time to be heard by equally large gatherings up to a distance of about 150 miles with the help of the Post Office land wires. The total equipment can be purchased outright or can be hired for 5*l.* per week. A powerful voice is no longer a necessity for a public speaker, and this ought to improve the quality of "orations" as the number of possible orators is largely increased. The distinguishing feature of the Marconi instrument is that it responds with equal sensitivity to all notes in the musical scale whether the sound originates 100 feet or 10 inches from its position. Recently a nightingale's song was broadcasted from the London broadcasting station, 2LO, by this device. The bird was singing about 100 feet away from the instrument, yet the song could be heard almost perfectly by broadcasting listeners. The apparatus has many points of difference from domestic loud-speakers. The construction is on the moving coil principle, and the diaphragm is of rubber and not of metal. As it has no natural or resonant frequency of its own, it is practically free from nasal defects, and there is no metallic timbre. The normal working range of one of these loud-speakers under reasonably silent conditions is approximately three-quarters of a mile.

**SORPTION OF GASES BY GRAPHITE.**—The sorption of oxygen by "activated" graphite forms the subject of a paper by D. H. Bangham and J. Stafford in the *Journal of the Chemical Society* for May. If  $s$  is the quantity of oxygen sorbed at time  $t$  after its introduction to the graphite, then the relation  $s = kt^b$  holds,  $k$  and  $b$  being constants, both for ordinary graphite and for graphite containing hydrogen sorbed in a discharge tube. The results seem to indicate that the sorption of oxygen by ordinary graphite is due more or less directly to the hydrogen which it contained on manufacture. No water seems to be produced by the sorption of oxygen by graphite containing hydrogen; the sorbed gases may be pumped off as such.