

Research Items

Baptism and the Gypsies. While popular belief in a prophylactic element in religious ritual undoubtedly survived late, it is not always easy to find records of specific instances in which a semi-magical efficacy is attached to any one form of observance. It is, therefore, of interest to find a writer in the *Journal of the Gypsy Lore Society* (Third Series, 13, pt. 4) directing attention to the excessive addiction to the rite of baptism of the gypsies at various periods of their contact with Christianity. In fact, in Saxony in the seventeenth century, it was found necessary to frame regulations for the institution of inquiry before the ceremony to check this abuse. Some are said to have had their children baptised nine and ten times; but in such cases, the motive appears to have been not superstition but gain, as on each occasion rich presents were obtained from the sponsors, who thought to acquire merit by standing for a pagan child. There is, however, a number of instances quoted, some going back to the end of the fifteenth century, from which it appears that while the gypsies cared nothing for religion, they were always anxious to get their children baptised in the belief that an unbaptised child was in a dangerous state. The Siebenburg gypsies, it is said, kindle a fire before the tent as soon as a child is born to keep evil spirits away, and extinguish it when the ceremony has made it unnecessary; and the Scottish border gypsies considered it unlucky to have an unbaptised child in a house. The magical effects of baptism were not confined to the child, but extended to any ornaments it wore. The Magdeburg church ordinances of 1652 forbade that children at baptism should be bedecked with corals, beads, gold and silver buttons and the like, in order that they too might acquire special power, though this is not attributed to the gypsies specifically, but "as common people say".

Prehistoric Pathology. A survey by Prof. A. V. Vallois of present knowledge relating to the pathology of prehistoric man, communicated to the Institut de Paléontologie humaine at the beginning of the current year, appears in *La Revue scientifique* (No. 20, Oct. 27, 1934). The general conclusion is that it is an error to suppose that our ancestors, living a wild and savage life, had acquired a greater resistance to disease than ourselves. There is, however, a difference in the diseases which were most prevalent, and this distinction is to be observed not only as between modern man and neolithic man, but also as between neolithic man and palaeolithic man. Rachitis does not appear to be present in palaeolithic man, but there is abundant evidence of rheumatoid arthritis, attacking the vertebræ as well as the limbs. It becomes increasingly common in the neolithic and bronze ages. Traumatic lesions are not very common in the palaeolithic period. In the neolithic age they become more frequent and are found in all the bones. Two facts are noticed—the presence of flint arrow-heads in the traumata, especially in the dorsal vertebræ, and the high proportion of cases in which the fracture heals with a good join. The observations of tuberculosis and syphilis are subject to the fact that no soft parts are available for examination; but otherwise there is no appearance of tuberculosis in the palaeolithic period, while in the neolithic,

bronze and iron ages cases are few. To a certain extent, there is uncertainty in the identification of the lesions of syphilis, but it would appear that there is no case of syphilis in palaeolithic man, and in the later prehistoric periods only a very few cases from France and one from Russia appear certain. Dental caries is not found in palaeolithic man in Europe, but appears in Africa in men of (probably) late palaeolithic age. It is found for the first time in Europe in mesolithic man at Aveline's Hole (Somerset) and Teviec (Brittany).

Babylonian Mathematics. In the second edition (1934) of Prof. R. C. Archibald's pamphlet "Outline of the History of Mathematics" (now published by the Mathematical Association of America), there is an account of the discoveries of Otto Neugebauer, an Austrian scholar connected with the Mathematical Institute of the University of Copenhagen, concerning Babylonian mathematics. From about 3500 B.C. until 2000 B.C. the dominant race in Babylonia were the Sumerians. Among their achievements were engineering works, such as the draining of marshes and the construction of canals, and the adoption of cuneiform script. They were familiar with weights and measures, bills, receipts and accounts, and could calculate interest at various rates. Their arithmetic was essentially sexagesimal, and the same symbol may mean 1 or 60 or 3600, which is a source of great uncertainty in reading their tablets. Near the beginning of the Christian era they used a special symbol for zero. They knew a few results in geometry, but, like the Jews, took the circumference of a circle to be three times its diameter. Unlike the Greeks, the Babylonians discussed geometrical problems from what may be called an algebraical point of view; the steps taken seem to lead to simultaneous linear equations or even to quadratics. Cubic and biquadratic equations were dealt with, by means of tables which gave the squares and cubes of all integers from 1 to 60. It is remarkable that they accomplished all this without possessing any algebraical notation, or, as far as we can judge, any general theory underlying their particular problems. Moreover, their work seems to have been unknown, for at least 1800 years, to the Greek pioneers in the same subjects. There are still many cuneiform tablets not yet deciphered, and further discoveries are anticipated.

Hybrid Ducks. Two hybrid ducks, natural crosses between the hooded merganser (*Lophodytes*) and the American golden-eye (*Bucephala*) are fully described by Mr. Stanley C. Ball in Bulletin 3, Peabody Museum, Yale University. One was shot at New Haven in 1920. The only other known record is that of a specimen taken in Maine in 1854, and presented to the Boston Society of Natural History. These two birds show certain differences, the latter being immature. In general, their plumage and other characters are a mosaic of the parental characters, as in number of tail feathers, tarsal scalation, marking of tertials and scapulars. In size, colour of head and form of bill, they are intermediate, while in various other characters which are present only in one parent they appear in modified form in the hybrid. References are made to various other hybrid ducks.

New Congrid Eels. Two new eels belonging to the genera *Arisoma* and *Congrina*, and a new Pleuronectid, *Poecilopsetta albomarginata*, are described by Mr. Earl D. Reid in the reports on the collections obtained by the First Johnson-Smithsonian Deep-Sea Expedition to the Puerto Rican Deep (Johnson Fund, *Smithsonian Misc. Coll.*, 91, No. 15; 1934). The author points out that tooth characters alone in classification of the congrid eels have very little value, since the variations are so extensive that intergradations are found throughout the group almost without exception. He states that the shape and position of the dental plates, spacing of the groups, and width of the bands of teeth seem to be the most reliable dental characters for purposes of generic distinction, and uses these in classifying the Congridæ discussed, dividing *Arisoma* from *Congrina* and its allies by the upper lip and its bone-like supports; in *Arisoma* the lip being turned upward into a flange, the bones of the facial canal do not send pointed processes into this flange; in *Congrina* the upper lip being without a flange, the bones of the facial canal send pointed processes to the edge of the lip. Examination of the material in the National Museum has revealed the presence of these labial elements, which were specially noted by Bleeker and Schmidt in *Uroconger*, in various degrees of development throughout the entire group of congrids. The pore-like slits in the lip in *Congrina* are shown to be vents of the muciferous channel, and not pocket-like pits for facilitating expansion of the labial membrane.

Life-history and Structure of the 'Cleg'. The common 'cleg', *Hæmatopota pluvialis* (family Tabanidæ), forms the subject of a paper by Dr. A. E. Cameron (*Trans. Roy. Soc. Edinburgh*, 57, Part 1, 1934). It appears that among 1,400 described species of Tabanidæ, only certain American and Indian species have been traced from the egg through all the larval instars to the adult. In studying the species in question, the author has provided the first complete account of the metamorphosis of a European species. It is noteworthy that the number of larval stadia varies from seven to nine or, in a few cases, to ten, and the species is univoltine or demivoltine. Observations are given on the mating behaviour, feeding and oviposition of the adult fly, and the methods of rearing the insect are described. A general description of the larval anatomy forms a large part of the paper, while the external characters of the pupa are also dealt with. Some account is given of the structure of the problematical organ known as Graber's organ and suggestions made as to its possible function. The paper contains 28 text-figures and a bibliography of the subject.

Respiration in *Ascaris*. Y. Toryu (*Sci. Reports Tôhoku Imp. Univ.*, 9; 1934) has examined the respiratory exchange of *Ascaris megalocephala*, which is not an obligate but a facultative anaerobe. This worm produces carbon dioxide by a fermentative process in the absence of oxygen, but by an oxidative reaction in the presence of oxygen. When the worms are placed in Ringer's solution containing oxygen, they consume the oxygen until the tension in the medium becomes about 0.06. The total amount of carbon dioxide produced in 24 hours at 38° C. per 100 gm. of worms was from 80 c.c. (by females) to 200 c.c. (by males) in the presence of oxygen, and from 20 c.c. (by males) to 80 c.c. (by females) in the absence of oxygen. That little production of carbon dioxide or consumption of oxygen occurred during the first

and the last few hours of the experiment suggests to the author that a true fermentation process took place.

Northern and Arctic Tunicata. The attention of workers on northern ascidians is directed to the fourth paper (*K. Svenska Vet. Akad. Handl.*, 3 Ser., 13, No. 3; 1934) by Augusta Årnäck-Christie-Linde, on the northern and arctic Tunicata in the Riksmuseum at Stockholm. The material of the northern Tunicata was obtained for the most part off the Bohuslän coast. The families included in this account are the Cionidæ, Ascidiidæ, Agnesiidæ and Rhodosomatidæ. Synoptic keys of these families and their thirteen genera and twenty-three species are given, and observations added on anatomical features and on the geographical and bathymetrical distribution.

Invert Sugar from the Cashew 'Apple'. In India the cashew, *Anacardium occidentale*, L., is largely cultivated for the nut, and the curious fleshy swelling of the axis beneath the nut is discarded. M. Srinivasan, of the Department of Biochemistry, Indian Institute of Science, has been exploring the possibility of utilising this fleshy 'apple' (*J. Indian Inst. Sci.*, 17A, Part 7). Alcohol could be obtained from its juice by fermentation, but the costs involved would not warrant large-scale production; on the other hand, the juice contains about 7 per cent invert sugar on the fresh weight of the apple and may easily find a use as a syrup. Pigments present in the juice render more simple its correct neutralisation by lime, and at neutralisation there is complete precipitation of albuminoids and tannins so that filtration is easy. The lime has then to be removed (as carbonate, sulphite or phosphate), before the juice is concentrated, when it yields a clear red syrup for which there may well be considerable demand, as invert sugar is in great use by confectioners. It may also serve as a useful source of lævulose, the sugar to which diabetic patients show so much tolerance.

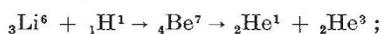
Mechanism of Disease Resistance in Plants. Prof. W. Brown's presidential address to the British Mycological Society appears in vol. 19, Part 1 of the Society's *Transactions* ("Mechanism of Disease Resistance in Plants", pp. 11-33, Oct. 1934). The address is a valuable and exhaustive review of modern knowledge about the physiology of parasitism. Various types of parasitic attack upon plants are described, and then the mechanism of penetration of the fungus is discussed. Chemotropic theories are reviewed, and shown to be inadequate to explain all the observed facts. Entrance by contact stimulus is also an incomplete hypothesis. It becomes increasingly obvious that mechanical penetration of the host takes place in most plant diseases. Sources of energy for this process, and possible supplies of food, are discussed. Some results obtained by the author show that fungi vary greatly in their penetrative power, and suggest that thickness of cuticle on the host plant may be a factor in disease resistance. Internal mechanisms of resistance are also reviewed, from both mechanical and chemical points of view. Four types of chemical resistance are recognised: (1) The composition of the plant may be unsuited to the growth of a particular fungus; (2) the composition of the plant allows ready growth of the fungus, but not the production of toxic substances; (3) no fungal attack occurs, although chemical composition of the host allows good growth; (4) the active principle of the fungus is unable to affect

the tissues of the host plant. Well-defined examples of each type are given, and suggest wide possibilities for further research.

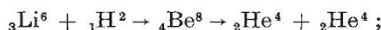
Meteorology of North-West India. The India Meteorological Department has published a small handbook dealing with the climate of the extreme north-west of India entitled "Meteorological Conditions affecting Aviation over the North-West Frontier" by Flight-Lieut. R. G. Veryard and A. K. Roy. Knowledge of the meteorological condition over the North-West Frontier has been derived largely from the records of the stations at Peshawar and Quetta, of several second- and third-class observatories, and of a number of rainfall stations. The region under review provides a considerable diversity of climates corresponding to the great differences in elevation; there are mountains which reach 26,620 ft. at Nanga Parbat in the Gilgit Agency, and low-lying plains bordering the Indus, that form part of one of the hottest areas in India. At Dera Ismail Khan, with an elevation of 590 ft., the mean daily maximum temperature exceeds 100° F. in the four months May–August and in June reaches 107·8° F., with a mean minimum of above 81° F. from June until August. Even at Fort Sandeman, with an elevation of 4,614 ft., a mean maximum of 100° F. is attained in June and July. Apart from the climatological tables there is a general discussion of all the meteorological elements over the whole frontier region, and detailed discussions of different parts of that region, and in these the year is divided into two main seasons, the hot and the cold, and two transitional periods. In the cold season (December to mid-April), depressions pass directly across the frontier to the plains of north-west India; there are about five or six to each month, and they cause changes in the weather of the kind usually associated with temperate depressions. In the succeeding transitional period that extends to about the end of June, the depressions follow more northerly tracks and generally give rise only to local convective rains. From July until September there are intermittent incursions of the monsoon, either directly from the Arabian Sea or indirectly across Northern India from the Bay of Bengal, and thereafter the second transitional period corresponding with the reappearance of eastward-moving depressions to the north of the frontier.

Formation of Emulsions. Prof. G. I. Taylor (*Proc. Roy. Soc., A.*, Oct. 1) has investigated the distortion and disruption of drops of fluid suspended in another fluid which has a non-uniform but mathematically definable field of flow. The breaking of the drops results finally in the formation of an emulsion. Drops of an oily mixture were suspended in a tank of golden syrup which was stirred by two parallel bands moving in opposite directions or by four rollers, the latter arrangement giving approximately hyperbolic lines of flow. The distortion of the drop at low speeds of flow was in agreement with a theoretical formula, but at higher speeds the shape of the drop varies with time. The ultimate fate of the drop depends very much on the ratio of the viscosities of the two fluids. When the viscosity of the drop is very small compared with that of the syrup, the drop elongates very greatly but does not burst; for higher viscosities of the drop, the drop elongates to a threadlike form and breaks up into droplets about one hundredth of the size of the original drop. For very viscous drops the parallel field of flow is no longer able to produce disruption.

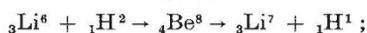
Nuclear Disintegration Experiments with Pure Isotopes. M. L. Oliphant, E. S. Shire and B. M. Crowther have recently described the separation of the pure lithium isotopes and their nuclear reactions under bombardment with protons and heavy hydrogen ions (*Proc. Roy. Soc., A*, Oct. 15). The isotopes were separated in a simple mass-spectrograph; ions obtained from a filament coated with a lithium mixture were accelerated into crossed electric and magnetic fields so disposed that the selected ions travelled in a nearly straight path. In one form of the instrument, electrostatic fields were used as 'focusing lenses'. The films of isotope were deposited on metal collectors cooled with liquid air. The quantities separated were of the order of 5×10^{-8} gm., the time of collection being about an hour for the less common Li^6 isotope. The specimens obtained were bombarded with ions of about 160,000 volts. Li^6 yielded with proton bombardment α -particles of 11·5 mm. range, probably obtained by the reaction:



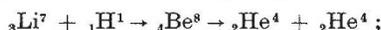
the He^3 particles being those observed in the present experiments. With H^2 bombardment, there was a large emission of α -particles of 13·2 cm. range:



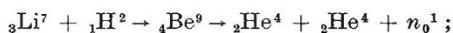
and of 30 cm. range protons:



Li^7 yielded 8·4 cm. range α -particles with protons:



and with deuterons a continuous spectrum of α -particles



the neutron emission being also observed. The nuclear reaction showed that the contamination of the isotopic specimens with the unwanted isotope was very small and in the worst cases of the order 1 per cent.

Origin of the Craters on the Moon. F. Leitich of Vienna has recently discussed the unsolved problem of the origin of the lunar craters, with particular reference to the outstanding example Copernicus (*Astro. Nach.*, 253, No. 6065, Oct. 1934). He considers and rejects the explanation, which has been suggested, that they are due to the impact of meteors, and concludes that they result from causes within the moon. In great detail he develops a new hypothesis, that they are due to volcanic action, but of a kind very different from that which, by the emission of lava, has formed craters upon the earth. In his view, the typical lunar crater was made by an outbreak of volcanic gases, slowly accumulating, through thousands of years, between the surface of the moon's crust and an overlying layer, some kilometres thick, of salts (chiefly chlorides of sodium, potassium, calcium, etc.). This outer layer is supposed to be very light, being cellular in structure, owing to the presence of much gas within it when it was formed. This light but strong layer is supposed to have become raised like a (very slightly arched) dome over the growing volume of gas beneath, until finally a collapse occurred. The author explains how this could give rise to the central peak, the mountain-walled plain, and the radial ridges beyond. He suggests that the condition of the disrupted borders of the craters may give an indication of the relative ages of the different craters.