

Research Items

Ancient Man in Devon

FOR some years past Mr. Reid Moir, in collaboration with Mr. and Mrs. MacAlpine Woods, has carried out archaeological investigations in the neighbourhood of Seaton and Beer in south-east Devon. These investigations have been confined to various deposits, ranging from Lower to, possibly, Upper Palaeolithic times, situated at some height above sea-level, but until recently no opportunity had appeared for examining the low-lying beds of the river valleys. Fortunately, however, a sewage plant is being erected on the Flood Plain at the junction of the River Coly with the Axe, and from the spoil heaps from the excavations a large number of flint artefacts have been found. The exposed sections are shallow and of small extent, but the succession of deposits, from below upwards, is clearly as follows: (1) Flood Plain gravel; (2) alluvium, with stones, 2 ft.; (3) alluvium, practically stoneless, 1 ft 6 in. The surface of the Flood Plain gravel at the site examined is approximately 15 ft. O.D. Judging from what has been discovered in other parts of Great Britain, the stony alluvium resting upon the Flood Plain gravel would contain an assemblage of artefacts dating from Magdalenian—late Palaeolithic—times to the end of the Stone Age, and it is of interest to note that among the specimens recently found by Mr. Reid Moir and Mr. and Mrs. MacAlpine Woods are a number of blades of flint, including some definite and well-made burins. It is possible that these may be of Magdalenian date, and afford further evidence of the former presence of Palaeolithic man in Devon. Other specimens in the series appear to be referable to later epochs, though nothing which can with confidence be assigned to the Neolithic period has yet come to light. The examination of the Colyford site is being continued, and it is hoped that it and the artefacts discovered may be described in the near future.

Potassium and Paralysis

FAMILIAL periodic paralysis, as its name implies, is a hereditary disability characterized by periodic attacks of paralysis usually of the limbs. Aitken, Allott, Castleden and Walker (*Clin. Sci.*, 3, 59; 1937) have recently published observations which promise to illuminate this hitherto obscure malady. A patient was observed who attributed his paralytic attacks to heavy meals. It was found that the attacks could with regularity be produced about five hours after the ingestion of 250 gm. glucose, or by the injection of twenty units of insulin, or most surely by the combined effects of glucose and insulin. Analysis of the blood during and between the paralytic attacks showed that the onset of paralysis was associated with a fall of serum potassium from the normal value of 16–20 mgm. to below 12 mgm. per 100 c.c. serum. The paralysis could be relieved in 15 min. by the ingestion of 12 gm. potassium chloride. A fall in serum potassium occurs in normal individuals when glucose passes from the blood into the tissues, but in periodic paralysis the fall is unusually great, and it is this abnormality which constitutes the essential feature of the disease.

Structure of Protoplasm

DR. A. R. MOORE is probably giving expression to a view very widely spread among biologists when he argues (*Scientia*, 62, July 1, 1937) that the conception of protoplasm as an emulsion, suggested by Bütschli and supported by some of Hardy's experimental results, was quite inadequate even to account for the behaviour of the cytoplasm of the cell. A useful purpose is probably served, nevertheless, in passing in review some of the considerations which suggest a more 'structural' basis. Thus in some merogonic hybrid embryos of echinoderms the tempo of cleavage of the cells of the hybrid is clearly determined by the parentage of the cytoplasm—not of the nucleus. In sea-urchin eggs, as the result of centrifugal action, it may be possible to obtain cells, clear of all dense inclusions, which behave quite normally on fertilization, but this clear hyaloplasm, although without visible structure, almost certainly has a structural framework conserving its role in the transmission of hereditary characters. The phenomena of flow in protoplasm is shown to be consistent with the presence of fibrillar elements; in this way alone would it seem possible to explain the behaviour of plasmodia of Mycetozoa, which will flow through hard paper filters with average pore size of 1μ though they are destroyed when forced through sieve pores less than 0.20 mm. in diameter. Dr. Moore's conclusion, that protoplasm contains polar particles or chains of molecules which, when occasion requires, link themselves into structural features, not only agrees with modern views of the mechanism of wall deposition at the surface of the plant protoplast, but also reconciles very generally the contrast between the mobility of the cytoplasm and the necessity for a structural framework to account for its performance in cell division and heredity.

Researches on Indian Fishes

IN *Current Science*, 5, No. 7, 1937, there are two interesting articles on fishes. The first is entitled "Geographical Distribution of Indian Freshwater Fishes and its Bearing on the Probable Land Connections between India and the Adjacent Countries" by Sunder Lal Hora, assistant superintendent, Zoological Survey of India, Calcutta. It is a summary of the remarks made at the Hyderabad meeting of the Indian Science Congress, during a joint discussion between the Sections of Geology, Botany and Zoology, on Wegener's theory of continental drift with special reference to India and the adjacent countries. The evidence provided by the distribution of the freshwater fishes of India indicates an eastern origin of the fauna and its subsequent dispersal to the west. The close relationship between the Indian and the African freshwater fishes can only be explained on the assumption of a land connexion between the two countries. The absence of the Schilbeidae from Ceylon and their presence in Africa suggests that Ceylon may have become separated from India at a stage earlier than the severance of the land connexion between Africa and India. In the second paper, P. Sen, entomologist, Bengal Public Health Department, "On the Food Factors of the so-called Mosquito-

Destroying Fishes of Bengal—*Panchax panchax*, *Barbus stigma*, *Esomus danricus* and *Trichogaster fasciatus*", shows that the plankton flora and fauna form the main food of *Panchax* although they also eat insect larvæ, that *Trichogaster* eats plankton with filamentous algæ, and that *Barbus* and *Esomus* are also essentially vegetable feeders. Thus *Panchax* alone of the four eats insect larvæ, and these only form a small portion of the food. There is apparently no justification in assuming that these fishes would eat the *Anopheles* larvæ except in very small numbers.

Inheritance of Leukæmia in Mice

LEUKÆMIA is a tumorous condition in which the leucocytes of the blood multiply rapidly. The symptoms are very similar or identical in mouse and man. There is often enlargement of the spleen and lymphatics as well as an enormous increase of the number of leucocytes in the blood. Dr. E. C. MacDowell (*J. Hered.*, 28, No. 4) has described experiments on the inheritance of leukæmia in mice which are of particular interest in their bearing on the relation between intrinsic and extrinsic factors. By brother-sister matings through eighteen generations, a genetically uniform leukæmic strain of mice was obtained. In a total of more than 600 mice, however, 10 per cent always failed to develop leukæmia. But the offspring of the negative mice developed the disease with the same frequency of 90 per cent. It is concluded that the 10 per cent negatives represent the balance between the genetic constitution of this particular strain and the particular environment in which they developed. When a negative strain is crossed with a male from the leukæmic strain, the F_1 show an incidence of nearly 45 per cent, and when F_1 males are back-crossed to the neutral strain the incidence of leukæmia is again halved. When the leukæmic heredity is derived from the mothers, the incidence of leukæmia in the offspring is significantly higher in all cases. By careful analysis and variation of the laboratory environment, it will probably be possible to determine which extrinsic factors are effective. It is also significant that the role of extrinsic factors varies with the intrinsic factors present.

Research on Wood-destroying Insects

THE *Journal of the Royal Society of Arts* (85, 407; 1937) contains a report of a lecture given by Dr. R. C. Fisher of the Forests Products Research Laboratory on the above subject. Special reference is made to the death watch beetle (*Xestobium rufovillosum*), and it is pointed out that there appears to be a definite relation between the presence of fungal decay in timber and the occurrence of this insect. It was also shown that the temperature and moisture content of timber are important factors in determining the rate of development of the beetle. Warm, dry conditions and the absence of fungal decay are unfavourable for this insect. Damage is usually most severe at, and often confined to, the built-in ends of timbers in buildings where ventilation is poor and where conditions are favourable for the accumulation of moisture and consequent risk of decay. The outstanding conclusion of recent biological studies is the importance of the presence of fungal decay. Experiments are in progress to determine exactly how fungal decay renders timber suitable for infestation. Also the fact that *Xestobium*

can continue to live and develop very slowly in decay-free timber has to be taken into consideration. Reference is made to frequent reports in the press, and by authorities seeking funds for repairs, of damage caused by the beetle to churches and other buildings. The result has been a general impression that the creature has increased its activity during the last few years. This idea, however, is erroneous, and the apparent spread of the beetle can be best explained by the increased interest taken in its occurrence, which leads to more thorough inspection of old timbers in buildings.

Cytology of the Genus *Poa*

J. M. ARMSTRONG has examined the chromosome numbers of twenty species of the grass *Poa*, with the result that previous suggestions are confirmed and extended: (1) that polyploidy is associated with species formation; diploid to dodecaploid species are described, the basic chromosome number being seven; (2) that aneuploid species are also present; three aneuploid species have chromosome numbers suggestive of a $9n$ origin (*Canadian J. Res.*, 15, June 1937). An interesting examination is made of the possibilities of the maintenance of a certain aneuploid strain with 54 chromosomes. In view of the obvious difficulties in the way of maintaining constant such an aneuploid strain through normal sexual fertilization, an apogamous origin of embryos from sporophytic tissue in the ovule seemed likely and has frequently been suggested. Armstrong, however, shows that the fertility of the pollen mother cells is surprisingly high and that polyembryony frequently occurs, but that the embryo sacs may all arise from megaspores produced after the normal reduction division. The author points out that the univalent chromosomes appear regularly to be included in the nuclei after reduction division. Four univalents are concerned, and in view of the high chromosome number their presence may not disturb the genetic balance if they undergo random segregation. Such random segregation would give 6 out of 16 pollen grains with 2 univalent chromosomes and, in view of the frequent occurrence of polyembryony, with good opportunities of meeting female nuclei with 2 univalent chromosomes also. Such gametes would contain 27 chromosomes in all and their union might maintain the strain by ordinary sexual reproduction; the author concludes that this is the method in which the aneuploid 'Mammoth' strain of *Poa pratensis* is reproduced.

Fulgurites from Witsands, Kalahari

AMONG the sand-dunes on the south-east border of the Kalahari desert, A. D. Lewis (*S. Afr. Geog. J.*, 19, 50; 1936) estimates that there are not fewer than 2,000 fulgurites ('lightning tubes') over an area of eight square miles. Curiously, however, the natives say that storms are not frequent and they have never seen the dunes struck by lightning. The friable tubes of fused silica are mostly found as broken fragments lying in the hollows between the dunes, and only rarely are they seen *in situ* projecting a few inches above the surface of the sand. Five tubes extending vertically downwards were excavated, but without reaching the lower end. The longest recovered (as fragments) measured 8 feet and showed some branching with a variable form and diameter (0.2-0.5 in.) along its course. Larger tubes (up to 2 in.)

have collapsed with the formation of longitudinal ribs. In one case threads of fused silica extend across the cavity, suggesting that the tube again expanded while still in a plastic condition. The sand surrounding the longest tube was seen to be "darkened as if burnt". Some previous records mention that the loose sand adjacent to the fulgurite is iron stained, suggesting that iron was vaporized from the fused silica. The author accepts, though apparently somewhat reluctantly, the view that these tubes were formed by lightning. One of his alternative suggestions is that they were formed by meteorites; this being supported by the statement that lechatelierite (silica-glass) has been found in meteorites—a statement that is quite incorrect.

The Baffin's Bay Earthquake of 1933

LATE on November 20, 1933, a strong earthquake was recorded at stations all over the world. The early estimates made at Kew, Strasbourg and elsewhere showed that the epicentre lay in Baffin's Bay, and, about a week later, it was reported that the shock was felt in western Greenland. The earthquake is one of much interest, for we have no record of any other in this part of the world, and the epicentre was so situated that the numerous stations in Europe, North America and Japan all lay within moderate distances from it. In response to circulars issued by Dr. A. W. Lee of the Kew Observatory, 99 records were placed at his disposal, more than two thirds of them from stations lying between 25° and 40° from the origin, and these are studied by him in a recent valuable memoir (*Meteorol. Office, Geophys. Mem.*, No. 74; 1937). The closest representation of the travel of the *P* waves to distances of 25°–50° is, he finds, given by a table based on one prepared by Gutenberg and Richter, the resulting position of the epicentre being lat. 73.3° N., long. 70.2° W., and the time at the origin 23h. 21m. 31.5s., G.M.T. The surface waves were very large, showing that the focal depth was not considerable. Indeed, from the average length (about 4 sec.) of the interval between the arrivals of the *P* and *sP* waves, it follows that the depth was about 10 km. below the surface. The apparent velocity of the *P* waves was uniform for epicentral distances from 25° to 40° and again from 45° to 50°, the velocity changing by 17 per cent from 40° to 45°. There are discrepancies between the observations of *S* and the existing tables. A new table for *S* for distances 25°–50° was, however, computed from the travel-times for *P* on the assumption that Poisson's ratio is constant for the rocks traversed by the waves, and the agreement between the observations and this table is satisfactory.

The Tenham Meteoric Shower of 1879

IN 1935, a collection of 102 complete meteoric stones, of aggregate weight about 108 lb., was presented to the British Museum by the widow of Mr. Benjamin Dunstan, formerly Government geologist of Queensland, who had been collecting information of the history and composition of the meteorites. This collection, described by Dr. L. J. Spencer in No. 156 of the *Mineralogical Magazine*, represents a remarkable shower that fell in 1879 at Tenham in a remote district of south-west Queensland. Thirty years ago, two large stones and one small stone (total weight, 134 lb.) from this district were acquired for the British Museum. Dr. Spencer relates the

history of these three "Warbreccan stones", which are almost certainly three belonging to the original collection made by Mr. M. Hammond, an eyewitness of the fall and who was alive in 1936. A chemical analysis of specimen stones made in the Government Chemical Laboratory at Brisbane in 1913 shows that their composition is that characteristic of the stony variety, that is, masses of crystalline rock with a small metallic content, as distinct from the type composed largely of metallic iron. This collection from the Tenham shower is stated to be the most complete example of a meteoritic shower in the British Museum collection of meteorites. Dr. Spencer describes schematically the passage of a stony meteorite through the earth's atmosphere, its stage of incandescence commencing at a height of about 100 miles; the subsequent explosion of the meteorite due to intense surface heating and to air pressure, followed perhaps by a second explosion and the fall to earth of the resulting shower of stones, the velocity of which is checked generally to that of an ordinary falling body—about 70 metres a second. In the case of a large mass of metallic iron, it will survive disintegration more easily and may arrive at the earth's surface with much greater velocity.

The Cannizzaro Reaction

THE mechanism of the Cannizzaro reaction, in which an aldehyde, for example, benzaldehyde, reacts with water in the presence of an alkali to give an acid and an alcohol ($2R.CHO + H_2O = R.COOH + R.CH_2OH$) has been investigated by using alkali dissolved in deuterium oxide, D_2O (Bonhoeffer and Fredenhagen, *Naturwiss.*, 25, 459; 1937). No deuterium was found in the CH_2 group of the alcohol. This means that the hydrogen from one aldehyde group is transferred directly to the carbon atom of the other aldehyde molecule (possibly after the two molecules have combined to give an acetal compound), without a dehydration of a hydrated aldehyde molecule and transference of molecular hydrogen.

Tests for Random Observations

W. O. KERMAK and A. G. McKENDRICK (*Proc. Roy. Soc. Edinburgh*, 57, 228; 1937), starting from an investigation of the fluctuation in the death-rate from ectomelia in mice in an experimental epidemic, have arrived at simple tests which will help to decide whether a series of numbers is *random*, that is, due to mere chance, or evidence of a real cause. A series which conforms to these tests is not necessarily random, but is likely to be so. On the other hand, failure to conform is evidence of non-randomness. The calculation depends on the *runs* and *gaps*, the average lengths and standard deviations of which are compared with what would be expected from pure chance. One obvious limitation of the tests is that they make use only of qualitative relationships and do not take into account exact magnitudes, so they do not make full use of the information available. On the other hand, there is the compensating advantage that no assumption is made about the law of distribution of the observations. These tests are applied to some examples, including Tippett's random numbers, telephone numbers, duration of measles epidemics, Swedish death-rates, Edinburgh rainfall and Edinburgh temperature. The results work out as might be expected in most cases, but the Edinburgh climate seems to defy prediction.