

## Research Items

### Bone Age Man

THE ABBÉ BREUIL in *Antiquity* of March argues for a much more extensive use of bone in the earlier phases of the Palæolithic period than is at present conceded by archæologists. In the Later Palæolithic period, the technique of bone is already far advanced, and the implements must have had more ancient prototypes; but in fact the only Middle Palæolithic examples known of bone-working by means of attrition and scraping are few in number—rib-bones sharpened by rubbing, occasional awls similarly sharpened, and two large spear-points of the Upper Mousterian from Castillo and La Quina, to which might be added the anvil blocks and trimming tools discovered by Dr. H. Martin. Further, stone suitable for implements does not occur everywhere, and the technique of its working is a process of long development. Therefore some authorities postulate an age of bone and wood. Man in the dawn of the industrial phase would naturally take the remains of animals killed by him, horns, antlers and bones, to use against them. The long bones would make excellent clubs, while others in their natural state could be used for pricking and piercing, or as planes and hammers, either in the natural state or when broken by a pebble. Bones, however, gnawed by carnivores or rodents show marks suggesting human workmanship, which are apt to deceive the archæologist. The bone claimed to have been worked by Piltdown man is an instance in point. Evidence for the use of slightly modified parts of his victim by early man is afforded in the cave of Castillo (Santandar, Spain) and Choukoutien (Peking). The evidence of the horns of ruminants and deer antlers, of skulls or parts of skulls, of jaw bones and long bones, of shoulder, iliac and trunk bones from both sources suggest the belief, at least, that at some ancient epoch the use of bones may have been of more importance than the use of stone.

### Ainu Marriage Ceremonial

IN an account of a traditional oration or song intoned or sung at an Ainu marriage which Dr. N. Gordon Munro collected from an Ainu learned in the lore of his people (*Man*, March 1938) he records the order of ceremonial in which the song was introduced. The song itself belongs to a class *Yai-kuru-e-karapa*, meaning personal speech-making, a term used only of an address on a felicitous occasion, but never for a funeral oration or at any other sad event. At a wedding, it is delivered by the father of the bride. On the occasion here recorded the song indicated that the daughter was an only child, and there is a hint of anxiety now relieved by the prospect of her children continuing the line. The bridegroom has been approved, more particularly as to his line of descent. Ainu society was matrilineal and rigidly exogamous, the evidence of descent of each group from an eponymous ancestress being furnished by a secret girdle, which no man dare examine and which it was taboo even to mention. It is a cord conventionally taken to signify a particular ancestral source, according to its length and consequently the number of times it is folded to make a girdle. Elderly women, who treasure their esoteric knowledge, decide whether

the girdle of the man's mother bears testimony to a descent other than that of the girl. All preliminaries ended and marriage gifts exchanged (there is no bride-price), and the most revered and trusted Kamui Fuchi—spirit ancestress of all Ainu who comes to light in the hearth-fire—having been solicited, all is in order. The bridegroom has sent to the home of the bride material for the sacred brew, which takes a week to make from millet with ritual precautions. When the guests have assembled for the feast, the father makes a speech or recitative in poetic form, which preludes the ancient rite of handing the cup of the sacred brew to the bridegroom, who drinks half and gives the remainder to his bride. Should she refuse it there is no marriage. The bride takes the cup and raises it to the level of her forehead, swings it gently thrice to right and left, drinks, and then performs the characteristic feminine gesture of *rai-mik*, in which the forefinger of the right hand is drawn from that of the left hand up the arm and across the upper lip.

### Influence of Circulation on Size of Blood Vessels

BY means of an indirectly illuminating microscope and a moist, warm chamber it is possible to study development of the vascular system in a living chick blastoderm still on its yolk for a period of seven days. This method was chosen by A. F. W. Hughes (*J. Anat.*, 72, Oct. 1937) to investigate the influence of the rate of circulation of the blood upon the diameter of the blood vessels. The rate of flow in the arteries and veins of the area vasculosa was determined by measuring the speed of the corpuscles in the margins of the vessels, and is termed the 'marginal velocity'. In the first ten hours the increase in diameter of the vessels may be 40 per cent per hour and the marginal velocity 4 mm. per sec. During the third and fourth days the marginal velocity drops to 1.2 mm. per sec. and the increase in diameter to 5 per cent per hour. Thus there is a correlation between marginal velocity and rate of increase in diameter of the vessels; the relationship, however, is not a simple mathematical one. In arteries, the mitotic rate of the endothelium is sufficient to account for the increase of diameter. When the veins are increasing rapidly in diameter, however, the mitotic rate of the endothelium is only sufficient to account for about one fifth of the increase in diameter. Since no noticeable increase in cell size is discernible, it is suggested that the remaining four fifths of the cells are supplied by the immigration of cells from the adjacent mesenchyme.

### Crabs of America

MISS MARY J. RATHBUN completes her series of handbooks on American crabs in a fourth volume, "The Oxystomatous and Allied Crabs of America" (United States National Museum, Bulletin 166, 1937). The former volumes have dealt with grapsoid crabs (Bulletin 97), spider crabs (Bulletin 129) and caneroid crabs (Bulletin 152). All these works are based on an enormous amount of material and the whole is exceedingly valuable. Carcinologists are fortunate in having this complete work by one of the greatest authorities on the subject. The present volume includes *Gymnopleura*, *Oxystomata* and

Dromiacea; also the Haplocaroinidea, the position of which in the Brachyura is uncertain, and one single example of *Geryon* (Brachygnatha) omitted previously from the volume on Grapsoids. The Dromiacea are still regarded as belonging to the Brachyura in spite of the fact that the larvæ differ entirely from any brachyuran zoea. The Oxystomata are the largest group represented and occupy the greater part of the volume (pp. 75-258). In this sub-tribe are many very interesting forms, some of peculiar shape, some so exactly resembling the pebbles in which they live that it is difficult, if not impossible, to detect them in their natural surroundings. The Calappidæ with their large chelæ which cover the ventral surface are also included here. The 86 plates, mainly from photographs, are good and clear.

#### Indian Brackish Water Fauna

N. Kesava Panikkar and R. Gopala Aiyar (*Proc. Ind. Acad. Sci.*, 6, Nov. 1937) have investigated the fauna of the brackish waters in the neighbourhood of Madras, particularly in regard to its relation to its habitat. The temperature of the water varies during the year from 25.0° C. to 29.6° C., its pH from 8.48 to 9.15, its salinity from 16.91 to 30.44 per mille. The change from marine to brackish water conditions is somewhat abrupt. Ninety-two species of invertebrates, eighty belonging to typically marine groups, are recorded, and this excludes Protozoa and Rotifera. The majority of the fifty-four fishes recorded are more or less permanent inhabitants; seven freshwater species and a few casual or seasonal migrants comprise the remainder. The fauna on the whole is typically marine. The animals are discussed from the point of view of their ecology and adaptation to their environment, which is described in detail. The vertical and regional distribution of the organisms is described, and there is a discussion of the general problems of the biology of animals in brackish water in the light of the facts brought forward.

#### Osmotic Values of Plant Tissue under Snow

DURING the British East Greenland Expedition of 1935-36 under the leadership of Dr. L. R. Wager, Dr. and Mrs. H. G. Wager carried out observations throughout the year upon the osmotic values of typical plants in Kangerdlugssuak, East Greenland. The osmotic values were determined by a plasmolytic method using sections or stripped portions of the epidermis and cane sugar solutions. Some of the species examined showed a sharp rise in osmotic value in late autumn, probably associated with the falling temperature both directly and indirectly, through the fact that the soil water was thus rendered unavailable. The most interesting result is the fact that five plants—two species of *Salix*, *Empetrum*, *Viscaria* and *Cassiope*—show a marked fall in osmotic value during the winter, whilst buried under the snow. The authors suggest that this is probably associated with a change in the water balance. Under the snow the air is continually saturated with water vapour and the water shortage in autumn, very clearly shown in some species by the shrunken protoplasts when examined in oil, no longer exists, the cells slowly saturate with water and the osmotic pressure falls. Comparison between the osmotic values of some of the same plants grown throughout the seasons in Dublin suggest, however, that the group of factors determining the seasonal changes of osmotic pressure is very complex.

#### Disease of Australian Pines

A PROGRESS report for 1936-37 entitled "Needle Fusion of Species of *Pinus* in Southern New South Wales" by W. V. Ludbrook has been issued (Melbourne, 1937) discussing the disease known as 'needle fusion', 'fused needle', or 'curly needle', which is confined to Australasia, being important chiefly in Queensland, Tasmania and the coastal plantations of New South Wales. Investigations appear to show that it is severe only when the soil conditions are unsuitable to the trees planted, a case which has other parallels elsewhere with introduced exotics. There is no evidence that it is infectious, though the cause of the disease is still unknown. It is said that the commercial value of severely affected trees is permanently destroyed. Diseased trees exhibit varying degrees of stunting, die-back and needle abnormality, but are rarely, if ever, killed by the disease. The symptoms commonly appear 3-7 years after the trees have been planted. The majority of the species of *Pinus* commonly grown for afforestation in Australia are susceptible, *P. pinaster* being the chief exception. *P. caribea* appears to be relatively resistant. It is said that there is little or no chance that the disease will cause appreciable loss in plantations where the soil and climatic conditions are satisfactory. In Queensland, climatic conditions are very different from those where the investigations were made, so that the conclusions arrived at may not be applicable.

#### *Fusarium culmorum* on Wheat

THE fungus *Fusarium culmorum* has been described as the cause of various diseases of wheat, but modern investigations do not incriminate it strongly. G. Samuel and F. J. Greaney have, in fact, isolated it from healthy, high-yielding crops in three localities in the south of England (*Trans. Brit. Mycol. Soc.*, 21, Pts. 1 and 2, 114-117; 1937). One crop obtained the gold cup at the Bakers' Exhibition in London, yet in spite of this undoubted hall-mark, its roots and stems harboured *F. culmorum*. Very numerous isolates of the fungus were all mildly pathogenic under greenhouse conditions, and there would appear to be other evidence that the fungus really does cause damage in the northern parts of Great Britain. Such findings emphasize the need for greater development of the ecological side of plant pathology. A close alliance of laboratory studies and field estimations over a wide area is absolutely necessary for the correct evaluation of any host-fungus relationship.

#### Oceanic Sedimentation

FROM the stratification of the bottom samples collected during the *Meteor* Expedition, Schott, in 1935, calculated the average rate of deep-sea sedimentation at 1 cm. per 1,000 years. This estimate was based on the reasonable assumption that 20,000 years have elapsed since the climate was considerably colder than at present. In an interesting study of the problems raised by such rapid sedimentation, Ph. H. Kuenen (*Amer. J. Sci.*, Dec. 1937) points out that Schott's estimate appears to imply a total thickness of deep-sea sediments amounting to about 17 km. This, in turn, implies denudation of the continents of about 40 km., which is evidently far too high to be acceptable. Two modifying factors have to be considered, however, namely, compaction of the sediments, and the steady production of eruptive rocks throughout geological time. Appropriate

estimates of the effects of these factors then bring Schott's figures into close agreement with the results of other denudational statistics. It is concluded that the thickness of deep-sea deposits may be of the order 5-6 km. The bearing of such a thickness on isostasy, temperature at the lower surface of the oceanic crust, seismic propagation, the thickness of the continents, and the mechanism of continental drift is discussed. Kuenen shows that if South America drifted westwards for 3,000 km., the piled up oozes would, after complete isostatic compensation, form a mass equivalent to a plateau 200 km. broad at sea-level. Actually, the continental slope is there one of the steepest in the world and is fronted by deep-sea troughs. Evidently the problem of oceanic sedimentation is involved with others which cannot yet be easily solved.

#### Origins of Magmas

IN a stimulating paper on "The Origin of the Pacific Magma Types in the Volcanic Inner-arc of the Soenda Mountain System" (*De Ingenieur in Ned.-Indie*, No. 1; 1938), R. W. van Bemmelen reaches some petrogenetic conclusions of far-reaching importance. He points out that three different ways of magma generation may now be distinguished: (1) differentiation of a parental magma (primary or juvenile magmas); (2) magmatization of pre-existing crustal rocks by ascending emanations from the substratum (palingenetic magmas, now becoming more familiar as rheomorphic magmas); and (3) hybridization or contamination of juvenile or palingenetic magmas by assimilation of foreign material (syntectic or mixed magmas). On the basis of geological field observations, together with petrological and petrochemical investigations, in the area under review, the author comes to the conclusion that there are few direct indications of (1), whereas (2) and (3) are of great importance for the origin of calc-alkali or Pacific magma types. The observations strongly point to the possibility that at least part of the various types of Pacific igneous rocks are *not* the product of gravitational crystallization differentiation of a gabbroic parent magma, as has been commonly assumed, but that they are the result of the ascent of magmatic emanations, containing mainly silicon, aluminium and alkalis, whereby the sialic crustal rocks became locally magmatized. A valuable feature of the paper is the review which it contains of the recent literature relevant to the subject of magma formation.

#### Impact Stresses

IN a paper read before the Scottish Section of the Institution of Mechanical Engineers at Glasgow on March 3, it was demonstrated that stresses caused by impact loads may and do differ materially from those calculated on the assumption of statical equivalence. The subject of the research—described by Mr. R. N. Arnold under the title "Impact Stresses in a Freely Supported Beam"—was a portion of railway rail, 8 ft. span, and the bending stresses induced were found to be 20 per cent higher than those calculated on this assumption. The beam was subjected to impact loads by dropping weights of magnitude up to 470 lb. from different heights and at intervals of 4 in. along its length; records of its deflections were made by means of a scratch extensometer, the construction of which is described. These show the occurrence of 'sub-impacts'—the weight, in some

cases, striking the rail five times in what appeared to be a single impact. At the centre of the beam the deflections are seen to be initially positive, but at distances of 16 in. and more from the centre they prove to be initially negative and to become positive as the impact proceeds, thus showing a distinct divergence from the conditions of static bending. The analysis of the results obtained in this way and also by the use of thin pieces of paper inserted between the rail and the falling weight leads to the conclusions that impact effects, even in comparatively simple settings, are in general much more complicated than is supposed, and that while the ordinary methods give fair approximations for deflections, the errors which they introduce in the bending moments and stresses are excessive. This research had particular reference to the impact loads to which railway rails are subject due to such causes as non-circular wheels, rail irregularities, joints and crossings and to the trouble experienced with fatigue cracks. These grow internally in the head of the rail and are especially dangerous because their existence may be quite unsuspected until fracture occurs. Similar internal fissures have been produced by prolonged repetitions of a rolling load on a rail, and wheel impact load rather than bending moment has been indicated as the stress-determining factor. The results of the present series of tests are held to have exhibited the complexity of impact effects and the probability that the actual loads may be much more severe than are predicted by the usual approximate theories.

#### State of the Outer Planets

DR. HAROLD JEFFREYS has recently published a note on the state of the outer planets (*Mon. Not. Roy. Astro. Soc.*, 98, 3; Jan. 1938) in which he corrects certain misinterpretations of his previous papers on the cold conditions prevailing on the outer planets. His paper is largely suggested by Mr. B. M. Peek's paper (*Mon. Not. Roy. Astro. Soc.*, June 1937), where doubts are expressed regarding the deep atmosphere and thick layer of ice on Jupiter. In Dr. Jeffreys's second paper (*Mon. Not. Roy. Astro. Soc.* 84; 1924), he pointed out that an explanation of the observed radiation of Jupiter and Saturn—appreciably larger than it was possible to explain by solar radiation—would be possible if the planets possessed 1,300 times as much uranium per unit surface as is present on the earth. This, however, was not suggested as a serious explanation, as some appear to have thought. Another alternative explanation was departure from black-body radiation, made some two years later, but he does not consider that this is the correct one. He now suggests that if the surface temperature of Jupiter is about 150° absolute and we allow for solar radiation, the planet would have had time to lose 5,000 calories per gram—not an unreasonable amount. With suitable internal conditions the original heat may explain the difference between the observed and calculated radiations. Dealing with the thick ice layer, he does not consider that this implies cold interior conditions, because if the temperature gradient fell below some degrees per kilometre, convection would cease, cooling would be negligible, and a high central temperature would be possible. Dr. Jeffreys also attaches some importance to Wildt's suggestion that the ice would be in the form of Bridgman's high-pressure modification, Ice vi, which can exist at fairly high temperatures.