

## RESEARCH ITEMS

## Two Bronze Age Cairns in Wales

THE report on the excavation by Sir Cyril Fox of the Simondston and Pond Cairns, Coity Higher Parish, Bridgend, Vale of Glamorgan, which appeared originally in *Archaeologia* (87, 129-180, 1938), has now been issued in reprint as a publication of the National Museum of Wales (Cardiff: 1939, pp. 51, 2s. 6d.). Of the two cairns, that at Simondston is the earlier, its primary deposits in 'enlarged food vessels' indicating a date in Middle Bronze Age A, about 1500 B.C.; while the Pond cairn is definitely later, the deep collar of its well-wrought cremation urn belonging to Middle Bronze Age B, say 150 years later, or about 1300 B.C. Both cairns being situated on Lias limestone, the economic basis of their makers was similar, depending on a forest growth, mainly ash and other trees demanding calcareous soil, such as was widely occupied in neolithic and bronze age times in the Vale. The differences between the culture of the Simondston cairn and that of the Pond cairn are so profound that the latter must be regarded as intrusive in the district, while the former represents an ancient cultural tradition, the megalithic. The Pond cairn culture seems to be that of settlers from the other side of the Severn sea. Co-operation with workers in other fields of science (of which the results are here printed in appendixes) have produced results which indicate that the suggestion that the time had come to intermit for a period field-research on 'round barrows' was premature. Thus the present investigation has produced the first scientifically controlled record of wheat in the bronze age of Britain, the earliest record of barley, the identification of the charcoals of the fuels used for pyres and other purposes, and evidences of the use of coal in the bronze age in South Wales.

## Standards of Physical Development in School Boys

IN view of the lack of standards based on recorded measurement of groups of adolescents, whose home environment, health record, and heritage present favourable conditions, an investigation was undertaken by H. Bathurst Norman of 500 public school boys, who in every case exceeded the standard required of the nutritive elements for the maintenance of perfect health, and for purposes of comparison, a homogeneous group of 501 secondary school boys, such as those among whom, according to current reports, the diet compares unfavourably with that of public school boys. The age groups range from thirteen to nineteen years; and the height, weight, sitting height, lumbar pull, and chest girth in expiration and inspiration were recorded (*Lancet*, August 19). There are significant differences in the results of the two groups. At each year between the ages of fourteen and eighteen a boy of Group I is approximately 16 lb. heavier and 3 in. taller than a boy of Group II. His lumbar pull is 30 lb. greater. The difference in height is shown, by measurement of sitting height, to be due to difference in the length of leg; while a record of ratio of weight to height shows a greater weight per unit of height in the public school group. The differences in physique are maintained roughly throughout the age periods under review. There is no progressive deterioration in the

secondary school boy, nor any obvious tendency in the higher ages to approximate to the older of the public school boys. There is no abnormal acceleration of growth in either group. Heredity is an important influence in determining stature, but the real correlation is one of diet rather than of inherited genes. The limits of growth are due to heredity; but how nearly the limits are approached depends upon a variety of environmental conditions, of which correct nutrition during the growing period is one of the most important.

## Penaeids of the John Murray Expedition

DR. RAMADAN has recently described an interesting series of Penaeids (excluding the genera *Benthescyemus* and *Gennadas* of the sub-family *Aristaeinae*) (Crustacea: Penaeidae. British Museum (Natural History), The John Murray Expedition 1933-34. Scientific Reports, 5, No. 3; 1938). The material is rich, and besides this a number of Penaeidae in the collection of the British Museum material obtained by the German Deep Sea Expedition and other specimens have been examined for comparison. The descriptions are critical and detailed. A key is given to the genera of the *Aristeae*, the chief distinction being the presence or absence of a hepatic spine on the carapace and the presence or absence (or reduction) of podobranch on the third leg and epipodite on the fourth. Seven (or perhaps eight) species of *Aristeus* are known, four of which, including two new species, are represented here. In discussing the genus *Plesiopenaeus* (p. 50) the author contradicts himself, for in paragraph 1 it is stated that *P. edwardsianus* does not possess exopodites on the walking legs, whilst in paragraph 3 they are stated to occur in this species. Again, on p. 51 it is inferred that they are absent. As Bouvier distinctly says that exopodites on the walking legs are absent in *P. edwardsianus*, the first statement is almost certainly correct and the second a slip; but an important slip in this case when the validity of the genus *Aristeopsis* is involved. Dr. Ramadan agrees with Burkenroad that *Aristeopsis* should be regarded as a synonym of *Plesiopenaeus*.

## White Rot of the Elm

THE fungus *Ustulina vulgaris* causes the rotting of several kinds of forest trees, and its depredations have formed the subject of a recent series of papers by Mr. W. H. Wilkins. He has lately considered the parasitism of the organism upon elm (*Trans. Brit. Mycol. Soc.*, 23, Pt. 2; July 1939), and proved its pathogenicity by isolation of the fungus and re-infection. The sap-wood of the host is not attacked; but cells of the heart-wood apparently lose their starch and become discoloured, though no fungal hyphae have been found. Patches of diseased wood occur, however, delimited by a black line, and hyphae occur within this zone. It is suggested that parasitism of the fungus occurs in two stages, namely, infiltration, where products of the organism diffuse into healthy heart-wood, and cellular disintegration, which progresses only in the presence of the fungus. The disease is similar to a white rot of the lime, caused by the same pathogen.

## Rayleigh Waves in an Inner Stratum of the Earth

K. Sezawa and K. Kanai, by mathematical calculation (*Bull. Earthq. Res. Inst., Tokyo*, 17, Pt. 2, 179-189; 1939) have determined several properties of Rayleigh waves such as can exist and be transmitted through an inner stratum of the earth. Some of the more important of these properties may be summarized as follows. In every case the velocity of the boundary waves ranges between the velocity of distortional waves in the stratum and that in the adjacent media. In the case of the displacement distribution of the waves that is symmetrical with respect to the middle plane of the stratum, there is only one dispersion curve for any ratio of  $\mu'$  to  $\mu$ . In the case of the distribution that is anti-symmetrical with respect to the middle plane, there are in general a number of dispersion curves for certain ratios of  $\mu'/\mu$ . These dispersion curves correspond to the waves of the fundamental and higher order types, namely, waves with several nodal planes of vibration parallel to the stratum. Yet even in the case of waves of anti-symmetrical vibration, if the velocity of distortional waves in the stratum is higher than that in the outer media, there is only one dispersion curve that corresponds to waves of fundamental vibration. The ordinates of the dispersion curves at abscissa  $L/H = 0$  represent the velocities of Stoneley waves that are transmitted along any one boundary between the inner layer and the outer media.

## Magnetic Observations in Sweden

We have just received the second part of the report of the general earth magnetic investigation which was carried out during the period 1928-34 by the Geological Survey of Sweden. The first part of the report was published in 1936 under the title "A General Earth Magnetic Investigation of Sweden. Part 1—Declination S.G.U. Ser. Ca. No. 25", and this second part, which is No. 29 of the same series, entitled "Inclination", was compiled by Dr. Kurt Molin. Older determinations have been taken into account, as have also the measurements made by the Hydrographic Service of Sweden, but the chief part of the work has been done by seven persons on twenty expeditions. There were 2,257 observation places with an average of one I point in 177 km.<sup>2</sup> and a rather greater density in Skåne. Dip circles were used throughout. For the mountainous districts, on account of its lightness, Chasselon dip circle No. 84 having a needle 6.5 cm. long was used, but owing to this not being so accurate as the other dip circles such as the Dover 8.9 cm., Casella 8.7 cm. and Gambey 25 cm., it was not used after 1931. An account of the corrections made and the method of reduction of the observations to the main epoch 1933.5 is given, together with explanatory maps and graphs. The main inclination table covers 42 pages, giving in each case the name of the station, latitude, longitude from Stockholm, altitude, geology, date of observation, values of dip in 1928.5, number of observations, average error, inclination in 1929.5 and 1933.5, and 1933.5 observed-calculated values. Four very valuable and beautiful colour-printed maps appended give: (1) inclination for epoch, July 1, 1933, (2) lines of equal anomaly, (3) values of anomaly of inclination, and (4) anomaly of inclination of Skåne. Since Sweden is interested economically in her iron ore deposits, this publication should be particularly valuable to Swedish authorities although it also affords a very valuable addition to the data

of terrestrial magnetism and geology. Investigators interested in greater detail than it has been possible to give in this Swedish publication may obtain transcripts or photographic reproductions of the complete tables from the Geological Survey of Sweden.

## Hydrolysis of Alkyl Halides

CONSIDERABLE controversy has centred around the interpretation of the rates of hydrolysis of alkyl halides by neutral water, one hypothesis assuming a slow dissociation of alkyl halide into halide ion and organic cation with an incomplete valency shell (an 'open sextet'), followed by the rapid reaction of this cation with water to yield alcohol and hydrogen ion, whilst the other hypothesis postulates that the rate-determining step is a bimolecular reaction of a water molecule with alkyl halide to yield halide ion and a cation the valency shell of which is completed by co-ordination of a previously unshared electron pair of a water molecule. R. A. Ogg, jun. (*J. Amer. Chem. Soc.*, 61, 1946; 1939), has reviewed the energetics of the various reactions and finds that the dissociation of an alkyl halide (in aqueous solution) into a methyl ion with an 'open sextet' and a halide ion is endothermic by at least 50 k. cal. per mol, and more probably by 70 k. cal. On the other hand, reaction with water to yield halide ion and the co-ordinated methyl ion  $\text{CH}_3\text{OH}_2^+$  is practically thermoneutral. Comparison with the experimental data for methyl halide hydrolysis shows that the first hypothesis stated (involving  $\text{CH}_3^+$ ) is much less probable than the second (involving  $\text{CH}_3\text{OH}_2^+$ ). It is suggested that carbonium ions with an open sextet never play an appreciable part in observable organic reactions and that mechanisms involving such ions should be abandoned.

Vitamins  $\text{K}_1$  and  $\text{K}_2$ 

THE antihæmorrhagic vitamins have recently been isolated in a condition of demonstrated purity and some work on the degradation of vitamin  $\text{K}_1$  has been reported, so that preliminary suggestions as to their structure have been made. The evidence from the degradations is incomplete and in some points uncertain, so that L. F. Fieser, W. P. Campbell and E. M. Fry (*J. Amer. Chem. Soc.*, 61, 2206; 1939) have made some synthetic studies of quinones related to vitamins  $\text{K}_1$  and  $\text{K}_2$ . The quinonoid character of the two vitamins was reported by Doisy, and it now appears that the absorption spectra of the vitamins resemble those of 1,4-naphthoquinones more closely than those of other series. Such a structure would account for a number of properties of the substances, and the chemical properties and absorption spectra of synthetic model compounds, as well as the marked antihæmorrhagic activity of 2,3-dimethyl-1,4-naphthoquinone (assayed by the Almqvist procedure), lend support to the formulation of vitamin  $\text{K}_1$  as 2-methyl-(or ethyl) 3-phytyl-1,4-naphthoquinone and of vitamin  $\text{K}_2$  as 2,3-difarnesyl-1,4-naphthoquinone. The purple colour reaction of  $\beta$ -unsaturated alkyl naphthoquinones with sodium ethylate is shown to involve the replacement of the unsaturated side chain by hydroxyl, which accounts for the formation of a phthiocol-like pigment as the end-product of the colour reaction with vitamin K concentrates, and the pigment is probably phthiocol or the ethyl homologue. The phthiocol isolated from human tubercle bacilli may have arisen from the alkaline cleavage of a K-type vitamin.