Research Items

Kisi of Liberia

AMONG ethnographical papers presented to Section H (Anthropology) at the Norwich meeting of the British Association was an account by Miss E. D. Earthy of the Kisi of Liberia, a tribe little known to anthropologists, which speaks a semi-Bantu language, although surrounded by peoples of the Sudanic linguistic group, and has been little affected by European culture contact, being economically independent of foreign civilisation. Their villages are built on hill-tops in the forest, where the borders of Liberia, French Guinea and the Sierra Leone Protectorate meet. The people are probably of mixed Hamitic-Negro stock with a strong pygmy strain in some of the villages. The ruling class are of fine physique, and live by hunting, fishing and agriculture. Their chief food is rice seasoned by palm oil. Their currency is twisted iron rods, used for the bride-price and commerce in the markets. The paramount chief rules over a large number of clans and sub-clans. The tribe is totemic, and inter-totem marriage is forbidden. Polygamy prevails. Names up to the sixth child of either sex show the order in which the children are born. Both sexes have to undergo a severe course in the bush initiation school. Their religion is a mixture of animism and totemism. An important sacrificial rite takes place when the rice harvest is over. The sacrifice is performed on the top of a high and inaccessible mountain, of which the name is never divulged to strangers. The office of priest, as is that of trumpeter, is hereditary. The sacrifice is a sheep, which is slain by the priest, the blood being collected in a bowl held by a member of a special family, in which the office is hereditary, who touches the hand of each worshipper with the blood, which the latter must then rub over his face, especially the forehead. The priest then prays for the prosperity of the people and country. In returning, no one must look back at the mountain or fall, otherwise he will die.

Prehistoric Copper and Bronze

SOME further results of the analyses of copper and bronze from excavations in Sumeria and from other archæological sites in the Near and Middle East are given in the report of the Committee on Sumerian copper presented to Section H (Anthropology) at the recent Norwich meeting of the British Association. A chronological arrangement by Dr. Plenderleith of the results of the Committee's examination of specimens from Ur shows that the single object examined from the al'Ubaid period is of nearly pure copper; of eleven objects from the Royal cemetery, nine are bronze, while two contain only small proportions of tin; and that while both copper and bronze occur in the Sumerian period, objects of the Sargonid period are either of copper or contain only a small proportion of tin. To these must now be added four objects from Jemdet Nasr in which copper varies in percentage from 48·18 to 67·23; all show arsenic, varying from 0·20 to 0·93, and two show nickel in the proportion of 0·02 and 0·075 respectively. A copper rod from the same site, which was less corroded, gave percentages of copper, 82·33, nickel, 0·05, arsenic, 0·34, sulphur, 0·11. In none of these was tin present. In twenty-two specimens supplied by the Oriental Institute of Chicago from Tell Asmar, Khafaje and Alishar Huyuk, nickel was absent in two samples only, from Alishar. The Akkadian material from Tell Asmar showed no tin, and this metal was also absent from two objects of early dynastic age from Khafaje, and present only in the proportion of 0·40 in an early dynastic chisel from Tell Asmar. Some interesting results were obtained from copper objects from Tell Duweir (Lachish), Palestine. The metal had clearly come from sources other than those from which the Mesopotamian metal had been derived. It was, therefore, of special interest to examine ores and slag obtained from the Arabah district by Mr. J. L. Starkey. The ores proved to be a mixture of azurite and malachite with no tin, arsenic, nickel or lead.

The 'Rain Frog' of China

THE egg-laying habits of the rain-frog, *Kaloula borealis*, are correlated with amount of rainfall and temperature, so that under proper temperature conditions (something over 20° C.) a minimum threshold of about 40 mm. of rainfall is necessary. This amount of rainfall does not indicate the depth of the pools needed for egg-laying, since these may be drainage centres of larger areas (Ju-chi Li and Chang-shan Lin, *Pekin Nat. Hist. Bull.*, **10**, 45; 1935–36). Larval development provides another aquatic complication, for unless the pool in which the eggs are laid lasts through three weeks, the larvæ cannot complete their development. Furthermore, the larvæ feed upon unicellular organisms, and so are dependent upon the influx of organisms and their multiplication, which again depend upon washings from the heavy rainfall and appropriate temperature. The food habits of the adults are somewhat similar to those of frogs and toads, and since they prey upon injurious ants belonging to the Formicidæ, it is possible that thereby they benefit mankind.

Malformation in Adriatic Copepods

FOLLOWING his previous work on the same subject, Dr. Fritz Früchtl summarises his records of malformation in various appendages of several marine copepods in his paper "Beitrag zur Kenntnis der Missbildungen adriatischen Planktoncopepoden" (*Sitz. Akad. Wissen. Wien.* Math.-naturwiss. Klasse. Abt. 1. Mineralogie, Biologie, Erdkunde, **143**, 5 bis 7 Heft; 1934). These include abnormal antennæ, caudal furca and legs, the last being most frequently affected. *Temora stylifera* has been found by the author to vary considerably in both the absolute and relative length of the caudal furca and the relation of the branches to one another; but there are also abnormalities in the setæ, and a peculiar form is here shown in *Temora longicornis*, in which one branch is quite unlike the other and much shorter, the armature differing greatly. A table is given of all the malformations seen, with dates and localities, involving ten species of the genera *Calanus*, *Calocalanus*, *Aetidius*, *Temora*, *Acartia*, *Sapphirina* and *Corycoeus*. It is evident that such malformations are of not infrequent occurrence, and it is of importance to note these carefully when observed.

Deterioration of Cut Sugar Cane in Egypt

ALTHOUGH the loss in sugar value of the cane during a delay between harvesting and milling has been mentioned by investigators in other sugar-producing countries, the observations made by Dr. Rosenfeld in the Egyptian field cannot be over-emphasised from the planter's point of view (Bull. 155, Ministry of Agriculture, Egypt). Certainly the fact that a four days delay in delivering the cut cane means the evaporation of all the profits on the harvest serves to give point to the investigations at Mallawi. Though the extent of loss varies with the type of cane grown, yet in no case is it small enough to make a delay in delivery anything but a serious risk—even in the coolest harvest time when deterioration is least. At the same time, in cases of unavoidable delay, certain elementary precautions will minimise the loss. Of the actual manner of deterioration, the 'masking' of the remaining sucrose by the invert sugar, glucose, is perhaps the most interesting, for it means that loss is not only due to inversion but also to the formation of the glucose on the sucrose crystals, so that the latter cannot be extracted. From the facts put forward it seems that a delay in harvesting, until immediate transport of the cut cane is assured, is at any time preferable to a hold-up between the harvest and delivery of the cane.

Production of Vegetables for Canning

SOME problems in the growing of vegetables for canning was the subject of a paper read on September 6 by Mr. W. B. Adam to Section M (Agriculture) at the Norwich meeting of the British Association. The canning industry in England has developed rapidly since 1928, and although the present output is still about one twentieth of that in the United States, it has now reached approximately 100 million cans per year. The research work, conducted at Campden, deals with all aspects of the industry, selection of variety being one of the most important lines of work, particularly as vegetables for canning are grown under contract, and a steady supply throughout the season is essential. Biochemical investigations are also being carried out to determine the age at which the vegetables can satisfactorily—the sweetness of green peas, for example, is lost after a certain stage in their development owing to the sugars being replaced by starch. Technical problems inevitably play a prominent part in the industry, questions of colouring being among those which have received special attention, and a new process for the treatment of green vegetables has been evolved at Campden. Vegetables are canned within a few hours from picking, so that they are actually preserved in a fresher condition than those bought on the market for home cooking. Further, biological investigations in the United States have shown that canned vegetables generally have a higher vitamin value than those cooked in the usual fashion, so that from a dietetic point of view the vegetable canning industry is entirely justified.

Air Seasoning of Indian Timbers

WITH the increasing demand for timber, the great waste due to the common use in the tropics and sub-tropics of green timber has gradually received recognition. If insect attack is left out of the question, the material in log form is subject to splits, shakes, end-cracks and decay, whilst converted timber owing to bad stacking and other evils incurs even greater loss by depreciation. Furthermore, the climate itself, with the great degree of variation in temperature and moisture throughout the year, results in enormous waste, both before and after the finished article has been turned out. The difficulties in India, as is pointed out in Dr. S. N. Kapur's "Manual on the Air Seasoning of Indian Timbers" (Forest Research Institute, Dehra Dun. Delhi: Manager of Government Publications, 1934), are due to the absence of any large-scale wood-using industries in the country other than railway workshops and ordnance factories, most of the wood-working industries in India being carried on in a small way, usually employing manual labour, their requirements of timber being small and consisting of a variety of species and thicknesses which preclude the installation of any expensive plant like seasoning kilns. It is for this reason that the author holds the opinion that an improvement in the general wood utilisation in India can only be brought about by the introduction of proper methods of air seasoning. It is, therefore, with this question of air seasoning that the manual deals under sections devoted to moisture, shrinkage, the mechanism of wood seasoning, seasoning defects and their causes, the practice of girdling trees before felling (as is usually done with teak), water seasoning, green conversion, requirements of seasoning such as sheds, etc., practical methods of stacking timbers for seasoning, and the seasoning of railway sleepers. In a second part, the author deals with the air seasoning characteristics of various species.

Caledonian Orogeny of North-East Greenland

IN his preliminary report on this subject, C. E. Wegmann presents a discussion of the problems involved which is a model of its kind (*Medd. om Gronland*, **103**, No. 3, 1935). He shows that the sediments of the East Greenlandic geosyncline (up to 9000 m. thick over a width of not less than 200 km.) indicate a deep-going interruption of the Greenlandic shield on such a scale that the geosyncline must be looked upon as a tectonic element of first order in the architecture of the earth's crust. In Caledonian times, immense migrations of sub-crustal material due to igneous activity took place. In part, the material penetrated the rocks by a process of 'molecular migration', leading to the formation of large felspar phenocrysts, 'augen gneisses' and migmatites in great variety. Wegmann draws a distinction between a migration of elements through a stationary framework and a migration through a framework undergoing internal and external movements. He points out that where quartzites and schists are interwoven with felspar, not all the material has migrated, but only the part of it which rendered possible the formation of the felspar. When crystallisation outlasts the movements, the relict structures disappear, and the result is a granite of more or less massive character which nevertheless is itself only a mixed rock that has migrated as a mobile mass from its original place of development. Such granite is not to be regarded as the source of the migrating elements. The conclusion is reached that igneous phenomena so transformed the infra-structure of the Caledonian material that the conception of the mountain complex as being of germanotype character is deprived of support based on the opinion that the basement rocks are rigid, undeformed Archean masses. Every

line of evidence indicates that the mountain chain must be regarded as a deep-going interruption of the Pre-Cambrian shield. The later history is briefly summarised; further problems are indicated; and a detailed memoir on the whole—which will be eagerly awaited—is promised at a later date.

Geography of the North Sea Bed

A BATHYMETRICAL map of the North Sea floor compiled from the Admiralty Charts accompanies a paper on the subject by Mr. R. G. Lewis in the *Geographical Journal* of October. The map brings out a number of features that are often overlooked and raises a number of problems. River erosion explains many of the features, and Mr. Lewis traces what he calls the Silver River, the extended Rhine, to the west of the Dogger Bank and then northwards by changing courses. But more difficult to explain are certain features that are not clearly the outcome of river work, and suggest tectonic movements. There are a number of narrow elongated depressions. In the English Channel there are comparable troughs not connected with the river that once flowed there. Mr. Lewis suggests that these may be due to folds on the floor which have disappeared. A fold would hold up the water behind it. The water would flow along the course of the fold in a deepening channel until it found an outlet. Eventually the flow of water would destroy the anticline. Another problem that awaits explanation is the failure of the sand and gravel which lies over most of the floor to fill these depressions. The small elevations south-east of the Dogger Bank suggest not erosional features so much as heaps of moraine matter.

Specific Heats of Crystals

THE August 1 issue of the *Proceedings of the Royal Society*, *A*, contains the Bakerian Lecture by Prof. R. H. Fowler on "The Anomalous Specific Heats of Crystals". The lecture contains a general survey of the theoretical position and gives a new tentative theory of the contribution made by molecular rotation. The theory of specific heats is primarily the construction of the free energy function of the solid in terms of an assumed model for the crystal lattice, and this in turn involves the construction of a 'partition function' giving the probability of the different energy states. Assumptions were made by Einstein and by Debye which led to partition functions and to specific heat formulæ, and Debye's work has been recently extended by Blackman in a detailed consideration of cubic lattices. Fowler classifies as 'anomalous' any variation of the specific heat which does not arise from normal modes of vibration (small oscillations) of the atomic lattice. Such anomalies must arise in any case in which there is not a monotonic increase of specific heat with temperature. He classifies them into three types. In the first type the anomalous specific heat occurs around a certain temperature and, in some cases, in any event, the extra specific heat is used in exciting the atoms, for example, to states of higher orientational energy. The second type is distinguished by sudden disappearance of the anomaly above a certain temperature, and its explanation involves co-operative interactions between atoms of the lattice. Examples are the ferromagnetic interaction disappearing above the Curie point and the order-disorder transitions recently described by Bragg and Williams. The rotational contribution specially discussed by Prof. Fowler is of this type. The third type is the discontinuous absorption of heat at a transition temperature between phases.

Use of Electron Lenses for β-Rays

O. KLEMPERER (*Phil. Mag.*, Oct.) has applied to β-ray spectroscopy the known focusing effect of a short coil on electron beams passing axially through it. A short coil, with or without an iron mantle to concentrate the field, was used to focus the β-rays from a small radioactive source (Th *C*) on the window of a Geiger counter placed about a metre away. By varying the current in the coil, the power of the lens may be varied, and different β-ray energy groups brought into focus. This method is analogous to the focal isolation of light according to the method of Rubens and Wood, and good β-ray spectra could be secured. A further development was the construction of a magnetic analogue of an ordinary spectroscope, with magnetic lenses for telescope and collimator and a uniform magnetic field for a deflecting prism, but the experiments have not yet been completed.

Cerin and Friedelin

BY extracting ground cork with alcohol, Chevreul in 1807 obtained a material which he believed to be a wax and called cerine. In 1898, Thoms obtained it in a pure state and believed it to be related to the phytosterols because of its colour reactions. Another constituent of cork extract was prepared in 1899 by Istrati and Ostrogovich who, in return for the interest taken by Friedel in their investigation, named it after him. N. L. Drake and R. P. Jacobsen (*J. Amer. Chem. Soc.*, **57**, 1570; 1935) have now reinvestigated these materials. They find that the empirical formulæ of friedelin is $C_{30}H_{50}O$ and that of cerin $C_{30}H_{50}O_2$, plus or minus 2H, within the limits of error. The hydrocarbon to which friedelin is related is $C_{30}H_{52}$. The molecular weight was determined by the saponification of several enol esters. The colour reaction was not due to pure friedelin but to a sterol present as impurity. The presence of a double bond in friedelin is inferred from molecular refraction data and the colour reaction with tetranitromethane. Addition of bromine and hydrogenation were not effected, but one of the double bonds of ergosterol behaves in this way.

A Rectifying Valve for Radiological Work

MESSRS. PHILIPS METALIX, of 145 Charing Cross Road, W.C.2, have sent us a booklet on high tension rectification which should prove useful to the radiologist and the radiological engineer. They will find in it an explanation of the functioning of rectifying valves and the relative efficiency of various types. There is also given an account of the gas-filled valve, their latest production. They point out that every operation in the production of radiograms, from the time of switching on the mains until the removal of the film from the fixing bath, must be performed with the highest efficiency, if consistently good results are to be obtained. As a rule, the rectifying valve does not receive the consideration it deserves, and yet its performance is essential to good work. It often causes additional expense by wastage of films, and its failure can irremediably damage the X-ray tube and other valves in the circuit. The technical matter contained in this booklet will assist the radiologist in understanding present-day equipment.