NATURE

Research Items

Early Bronze Age in Wessex

MR. STUART PIGGOTT has examined evidence belonging to the final phase of the Early Bronze Age culture of Wessex with the view of establishing the existence of a culture corresponding chronologically with the food-vessel phase of northern England, and intervening, in a ceramic sense, between the beaker and cinerary urn, and forming a final phase in the Early Bronze Age (Proc. Prehist. Soc., N.S., 4, 1; 1938). Such a phase had been postulated in the typological series of bronze implements, while for a great many years a remarkable series of grave groups has been known, incorporating elements (often spectacular in their implication of material wealth), which are peculiar to the area. Obviously they throw a great deal of light on trade relations both internal and overseas. Analysis of the archæological evidence points to an intrusive culture with types divisible into two groups, those of a southern (maritime) origin and those whose affinities suggest early entry overland from the north. In the first category are bronze daggers with mid ribs and/or lateral grooves, certain pottery forms, notably incense cups, beads of blue faience, now established as of Egyptian origin; and in the second group gold ornaments of Irish origin, and beads and pendants, stone battleaxes of the Snowshill type, pins of Germanic type, and perhaps flanged axes. With the two groups are certain exceptional objects. We are thus faced at the end of the beaker phase with the sudden flowering of a true bronze age, marked by an opening up of trade connexions all over Europe, and the appearance of new types of weapons, tools and ornaments, and a radical change in burial rites. Such a change cannot have taken place without external stimulus, so radical that it cannot have been brought about except by actual settlement-a wave of prehistoric migration from Brittany, a dominant and intrusive aristocracy, who lorded it over a basic folk-culture of food-vessel type, which, however, ultimately absorbed it.

Secret Societies of Sierra Leone

A PRELIMINARY report on the expedition of the University Museum, Philadelphia, to West Africa in 1937 ("The Sherbro of Sierra Leone" by H. U. Hall. Pp. 52 with map. Philadelphia: The University Press, 1938) includes among other matters a de-scription of the place and function of the various secret societies among the Sherbro, or Bolom, of Sherbro Island and the chiefdom of Shenge (Kagboro), in which the old Sherbro culture is best preserved. The population of the island is estimated at 15,571, this figure including 1100 Mendi; while Shenge chiefdom is estimated to have a population of about 15,200. Sherbro Island consists of two chiefdoms, over each of which is a paramount chief, chosen from ruling 'houses' or rams, exogamous units composed of blood-relations, in some of which patrilineal descent now prevails. The matter of succession by descent figures not only in regard to rulership, but also in the matter of the organization of the more important secret societies, one of which, Poro, was formerly a powerful instrument of government. Secret societies still play a very significant part in

Sherbro life. A man who does not belong to Poro, or the third society intrusive Thoma, has no standing in the community. Membership of the women's society, Bundu, is also obligatory for women. Poro is exclusively for men, but Thoma is a mixed society, as is also the Ntundung society among the people of the Ndema chiefdom. Poro is now "put in the bush" about once in three or four years, the bush being a grove of large cotton trees, which, though not enclosed, is strictly barred to women and nonmembers. When Poro is in session the Poro "devil eats" the candidates, who are seized pro forma if willing, and violently if not willing. This is a ceremonial death through which the candidate enters the world of the spirits of the ancestors. Emergence from the bush at the end of the period of initiation is the equivalent of resurrection, or rather a new birth, brought about by "beating the devil's belly" until he vomits the candidates he has swallowed. In former times decisions affecting the affairs of a chiefdom, both internally and in relation to other chiefdoms, were all taken in the Poro council.

Distribution of Vitamins A1 and A2

G. WALD (J. Gen. Physiol., 22, 391; 1938) has examined the distribution of vitamins A_1 and A_2 in the eye tissues and livers of freshwater and marine fishes by means of the antimony chloride reaction, which yields with A_1 a band at 615-620 mµ and with A_2 a band at about 696 mµ. In the retina the presence of vitamin A₁ is diagnostic of the operation of a rhodopsin and vitamin A_2 of a porphyropsin cycle. The eye tissues of all permanently marine fishes examined except the tautog contained vitamin A1 alone, while those of all permanently freshwater fishes possessed only vitamin A_2 . Those of all potentially migratory fishes, except perhaps the alewife, contained mixtures of both A1 and A2. Most livers contained mixtures of both vitamins A, and occasionally in proportion the reverse of those in the eye tissues.

Nutritional Cytopenia in the Monkey

W. C. Langston, W. J. Darby, C. F. Shukers and P. L. Day (J. Exp. Med., 68, 923; 1938) fed young rhesus monkeys (Macaca mulatta) on a diet containing casein, polished rice, whole wheat, salt mixture, sodium chloride, cod liver oil and ascorbic acid, with the result that they developed a syndrome characterized by anæmia, leukopenia and loss of weight. Ulceration of the gums and diarrhœa were common, and death took place between the twenty-sixth and hundredth day. Four animals were given the deficient diet with the addition of 1 mgm. of riboflavin daily and developed the characteristic signs and died in periods of time similar to the survival of the other monkeys. Nicotinic acid alone or combined with riboflavin and thiamin chloride also failed to alter the course of the deficiency. On the other hand, when the deficient diet was supplemented with either 10 gm. of dried brewers' yeast or 2 gm. of liver extract daily, normal development took place, and there was a normal blood picture for a long period. It is obvious, therefore, that yeast and liver

extract contain a substance, for which the authors propose the term 'vitamin M', which is essential to the nutrition of the monkey, and is not identical with any of the factors of the vitamin B complex which have been chemically identified.

Action of Eserine on Pancreatic Secretion

L. LIACI (Biochim. e ter. experiment., 25, 445; 1938) carried out experiments on dogs to determine the action of eserine on the external secretion of the pancreas. He found that small doses of this drug ranging from 0.10 mgm. to 0.18 mgm. per kilo injected intravenously had a stimulating action on this secretion as the result of two different mechanisms. The first acted through the vagus, while the second was connected with an increase of the stimulus produced by secretin, which in turn had been increased in quantity by the action of eserine. On the other hand, larger doses of eserine led to a diminution of the secretion and larger doses still might arrest the secretion altogether if it had started spontaneously. Liaci also found that pancreatic juice secreted after the administration of eserine was capable of digesting coagulated albumin without having received any previous activation.

Colonization of Krakatau by Mammals

IN 1883, the great eruption of Krakatau destroyed all vegetation and covered the island with a layer of hot ashes several metres deep. It may be assumed, therefore, that, whatever mammals existed previously, none survived the eruption. In an interesting account of the mammals now present on the island, Dr. K. W. Dammerman indicates the stages of the colonization (Treubia, 16, 421; 1938). In 1908, Jacobson collected no mammals and saw none, probably none had yet arrived; but by 1919 bats, Cynopterus brachyotis, were present on two islands of the group; in 1920 a second species of the same genus was found on Krakatau itself, although on Verlaten Is. it did not appear for ten more years. It is noteworthy that these two species are fruit-eaters and that insectivorous bats were first collected in 1928 (Hipposideros diadema); in 1933 a fourth bat species made its appearance. The only other mammals which have so far gained a footing on the islands are rats. There was none in 1917, but by 1919 when a settler had been present for two years, the house-rat (Rattus r. diardi) had become a nuisance. By 1924, when the settler had gone and his house had already become a ruin, the rats had gone. This may have been due to the increase of the large python, but that is unlikely because by 1933 rats were again numerous. A second rat (R. r. jalorensis), the widespread Malay country-rat, had become established and was plentiful in 1928. The author notes that on his visits in 1933 and 1934 he saw a small and emaciated black dog, which must have escaped from some landing party and had been able to eke out a poor existence.

Migrations of the Gannet

THE origins of British gannets are few so that the movements of ringed birds are more easily related to breeding places. Of 6,384 gannets ringed, 203 have been recovered (3.2 per cent) and the recoveries, as analysed by Dr. A. Landsborough Thomson, show that birds in their first year are the most extensive rangers (*British Birds*, 32, 282; 1939). Indeed more young birds are captured in African waters than in

which by the end of December has carried at any rate the birds of the year beyond the southern limits of Europe. A few scattered records show that occasionally gannets born on the west coast of Britain find their way in later years to the North Sea and even to the Baltic, and one Bass Rock individual was recovered from the Faeroes, near another breeding station. The oldest gannet recovered had reached an age of nine years, and it was then within a few miles of Ailsa Craig, where it had been ringed as a nestling.

Names of British Fishes

SCIENTIFIC names of even common British animals are still in the melting pot of priority; but a useful effort to establish the nomenclature of ten families of British fishes has been made by A. Fraser-Brunner (Ann. Mag. Nat. Hist., Ser. 8, 2, 410; Nov. 1938). The changes indicated mainly concern generic and subgeneric names, and for the larger families keys to the characters of these groups are given. Two new generic names are used : Eutrigla for E. gurnardus, which seems to be confined to European waters and is the only member of the genus; and Diplecogaster to include three of the gobies, the former Cyclopterus bimaculatus, selected as the type of the new genus, Lepidogaster microcephalus and L. pellegrini. The list includes two species which have recently been added to the British list-Syngnathus rostelatus from the Thames estuary and Ammodytes marinus recently described by Raitt.

Size of Nucleus in Ricinus communis

IN a communication to the Editors, Flora M. Scott, of the University of California at Los Angeles, comments on the very large size of the nuclei in Ricinus communis. Nuclei of the apical meristem, 3-4 microns in diameter, measure approximately 38 cubic microns in volume; nuclei of the differentiated pith and cortex, 332 cubic microns. This eight-fold increase has been shown by Monschau (Protoplasma, 9, 536; 1930) to be a fairly general condition. In differentiating spiral elements, however, the diameters, or major axes of the larger nuclei range from 30 to 60 microns, so that resultant volumes may reach 50,000-60,000 cubic microns in round figures, an increase approximately 1,500-fold. When volume is plotted against frequency (some 1,800 nuclei were measured) a many-peaked graph is obtained. The earlier maxima occur at 332, 585, 755, 945, 1,146, 1,360 cubic microns, that is, at intervals of approximately 200 cubic microns. Thereafter the peaks occur with somewhat less regularity, and the curve flattens as it passes to 18,000, 22,000, 33,000, 55,000 and 60,000 in round figures. Since the diameters of the largest nuclei never exceed values approximately half the diameters of the containing vessels, nuclear diameter appears to be dependent on vessel diameter. Increase in volume is shown not to be attributable to chromatin. Dehydration of living nuclei by means of absolute alcohol indicates a relatively higher content of free (that is, removable) water in the largest nuclei, but the residual volumes after such dehydration show an actual volume increase over the meristem nucleus, 8 to 250-fold. This material is therefore mainly karyolymph. A detailed account will be published shortly.

A Dwarf Mutation in Coffee

IN an investigation of the genetics of the coffee plant, Coffea arabica, C. A. Krug, of the Instituto Agronomico of São Paulo, Brazil, has studied a dwarf type which appears in the variety Murta (J. Genetics, 37, No. 1). Very little has yet been done with the genetics of coffee, and it takes three years for the plants to mature and produce seed. The variety Murta has small leaves, and when selfed yields Bourbon, Murta and dwarfs in the ratio 1:2:1. Murta plants are therefore heterozygous for the recessive dwarf gene. Bourbon is somewhat taller than Murta, with larger leaves, and does not carry dwarfness. The gene for dwarfness is somewhat unstable, frequently mutating to tallness, and the opposite mutation, tall to dwarf, also frequently takes place.

X-Ray Mutations in Rice

A DETAILED account of X-ray mutations in rice is given by Dr. N. Parthasarathy (J. Genetics, 37, No. 1). The seeds of a pure line of rice were exposed to X-rays under different conditions for 1-3 hours and various types of mutations appeared. A semi-sterile mutant gave in the F_3 generation normal fertile plants, semisteriles and dwarfs in the ratio 1:2:1. The semisterility was found to be due to the association of four chromosomes in meiosis. A chiasma was frequently present in the homologous regions proximal to the interchange in a pair of chromosomes, thus indicating crossing-over of the interchanged segments resulting in chromatid non-disjunction and abortion of 50 per cent of the pollen grains. One semi-sterile plant had two chromatin fragments, but their presence produced no visible phenotypic effect and they are rapidly eliminated in gamete formation. The dwarfs in the progeny of semi-steriles showed regular meiosis and fertile pollen with the ordinary chromosome number, but they did not set seed. Their origin is discussed and was probably due to a small deficiency or a gene mutation at or near the point of interchange. Two other mutants were "Beaked sterile" is a primary (2n + 1)trisomic. type; while "stumpy" showed frequently a chain of five chromosomes, indicating that the extra was composed of segments derived from two nonhomologous chromosomes of the haploid set.

Empirical Studies of the Seismic Phenomena of Hawaii

THIS is the title of a widely ranged study of the earthquakes of Hawaii by Austin E. Jones (Bull. Seis. Soc. Amer., 28, No. 4, 313; 1938). Small earthquakes in this region are frequent and from a study of the records it appears that the greater number of P waves have a period of 0.3 sec. whilst there is a subsidiary maximum of 0.5 sec. The S waves chiefly have a period of 0.5 sec., and there exists a subsidiary maximum of waves with a 0.8-sec. period. Large periods and amplitudes appear to go together, and the upper limits of the amplitudes were found to vary with the cube of the periods, though this probably holds only for local shocks. About 60 per cent of the foci are less than 5 km. deep and 70 per cent less than 10 km. deep. Most of the deep foci are under Mauna Loa and in the Kilauea south-east rift zone. A large number of the shallow foci are in and near the Kilauea crater. The location of epicentres near and on the extension of rifts and in pronounced lines and zones suggests a larger and more numerous system of rifts than has previously been mapped. The resulting pattern of rifts about

Mauna Loa is roughly an asterisk, and the main group of epicentres is on the visible active rifts to the south-west and east-north-east of Mokuaweoweo.

Deep-Focus Earthquakes and Earth Structure near Japan

T. SHIDA discussed this subject at the opening of the Beppu Geophysical Laboratory on October 28, 1926; but it was not made generally available in Japan until 1937 (Tikyû-Buturi (Geophys.), 1, 1; 1937). The author's attention was directed to the peculiarities of the earthquake of January 21, 1906, it probably having a great depth of focus; but it was not until the similar earthquake of July 27, 1926, with epicentre near the Biwa Lake, that confirmation could be obtained. The depth of focus of this latter was about 260 km., or about twice the depth of isostatic compensation as generally accepted. The preliminary tremors indicated a shock of the fracture type, and this would seem to indicate appreciable strength to a depth of, say, 300 km., where the pressure may be expected to be of the order of 100,000 atmospheres. In Japan, the origins of some deep focus earthquakes seem to lie on a line running north-west-south-east through Honsyu. Shida is of the opinion that some slow process is always going on at a depth of about 300 km. in the neighbourhood of Japan, and that this is the true cause of seismic phenomena there, especially near the centre of the main island. The same author also thinks that there may be a jump in contraction of the earth's crust at a depth of about 300 km., and this may be the true cause of crustal changes and movements all over the world.

Research in Fuel Technology

AT the tenth autumn research meeting of the Institution of Gas Engineers, held in London on November 1-2, a number of papers on topical problems of the industry were received. One of them, however---the forty-third report of the Joint Research Committee of the Institution and the University of Leeds-was concerned with a possible future trend of fuel technology. This is the gasifica-tion of coal at high pressure. The report dealt with the condition under which gaseous hydrocarbons are synthesized from the elements at high pressure. It was shown that carbon, which combines only sluggishly with hydrogen at atmospheric pressure, can be caused to react freely at a red heat under pressure no higher than fifty atmospheres. Starting with coal or low-temperature coke, there is a rapid reaction with hydrogen as the temperature rises through a zone of temperature at which the structure of the coal or carbon is changing in the carbonization process. Above this temperature zone the reaction speed is greatly increased by the presence of alkali, and the results leave no doubt of the feasibility of gasifying British coal completely to yield gas of high calorific value suitable for public distribution. Moreover, the rate of gas production is much greater than currently experienced. Under some conditions, the thermal value of the gas produced per ton of coal per hour was more than fifty times greater than now obtained in gasworks practice. Naturally the supply of hydrogen is a vital factor in the economics of such a process, and this is envisaged as being obtained by the gasification of carbon with steam and oxygen The results disclosed open the under pressure. possibility of radical changes in the preparation of gaseous fuel. In such a process the gas would be generated under pressure, which would favour its wide distribution from central generating stations.