

Research Items.

CELTS FROM KNOLE PARK, SEVENOAKS.—Mr. J. P. T. Burchell contributes to *Man* for June a further note on the unorthodox association of polished celts and stemmed and barbed arrowheads from Knole Park. The celts, which have thin butts and pointed oval section, according to the Scandinavian chronology should belong to the pre-Dolmen period, but in England they have been found, as at Bexley Heath, in association with celts having a thin butt and square sides, and must be considered as having survived well into the Dolmen period. The celt with thick butt characteristic of the second Dolmen period in Scandinavia was not adopted in England. At Seamer Moor, Yorkshire, celts with thin butt and pointed oval section were found with expanding edges and incurved sides, together with kite-shaped arrowheads. In the passage graves of Scandinavia occur narrow-bladed diggers, shaft-hole axes with expanding cutting edges and incurved sides, together with hollow-based arrowheads. It is suggested that some of the artefacts of the passage-grave period in Scandinavia and Britain are copies in flint of existing metal types of more southern lands. The last period of Britain, the third phase of the Dolmen cult, is definitely of the Bronze Age, though the use of the metal is still deferred in Scandinavia. The Knole Park settlement, with its stemmed and barbed arrowheads typical of the neolithic period, cannot be much earlier than the times of the round barrows. The celts indicate that the settlement was occupied by descendants of the pre-Dolmen period and that they were under the influence of an alien race.

VERTICAL DISTRIBUTION OF MARINE MACROPLANKTON.—In the fifth paper on this subject (*Jour. Marine Biol. Assoc.*, vol. 14, No. 3, 1927, pp. 557-608) dealing with the catches of a stramin ring-trawl, Mr. P. S. Russell gives particulars regarding the animals other than young fish, which have already been dealt with. The hauls were made at serial depths during the daylight at intervals between April and August 1926 and give a valuable series of records for many important plankton species. In general, Mr. Russell finds that most species have an optimum level in the water in which they live in the daytime, though this may vary according to weather and other conditions in ways not yet fully understood.

PHILIPPINE HYDROIDS.—The late Prof. C. C. Nutting reports (*U.S. Nat. Mus. Bull.* 100, 1927) on the hydroids collected by the U.S. Fisheries steamer *Albatross* in the Philippine region. Hydroids were taken at 58 of the 115 dredging stations reported for that cruise, which does not indicate an extraordinarily rich hydroid fauna. The collection represents 10 families, 27 genera, and 54 species, and affords many new records of species not hitherto found in the Philippine region. Prof. Nutting remarks on the relative scarcity of gymnoblastic forms, there being but three species belonging to this group, and one of these, the giant tubularid *Branchiocerianthus imperator*, was dredged outside the Philippine area in Japanese waters. Twenty-six species, almost one-half of the total, belong to the family Plumulariæ. The author adds some remarks on the recent multiplication of names and the breaking up of old genera by Stechow, which tend in his opinion to confuse the situation, and he expresses his own preference for a conservative course in nomenclature.

HYBRIDISATION AND VARIABILITY.—'New Lights on Evolution' is the title of an address by Prof. E. C. Jeffrey (*Science*, May 13, p. 458), the burden of

which is an exposition of his well-known view that polymorphic genera of plants and animals are all hybrids. While formerly holding that hybrids were of no significance for evolution, he now appears to have adopted Lotsy's view that natural hybridisation is the only cause of variability. With all the ardour of a convert, he even maintains that *Drosophila melanogaster* is of hybrid origin, notwithstanding the abundant contrary evidence. The widespread occurrence of hybridism in flowering plants is recognised by many, but probably few would venture to see in it the sole effective cause of variation. Similarly, the author believes previous crossing to be the cause of parthenogenesis, but he omits to consider *Artemia salina* and its tetraploid parthenogenetic variety in this connexion.

TANAODON: A NEW PELECYPOD GENUS.—A most remarkable pelecypod from the Middle Devonian of China has just been described by Mr. Edwin Kirk (*Proc. U.S. Nat. Mus.*, vol. 70, art. 12). Externally it somewhat resembles Megalodon, and the author places it in the Megalodontidæ. The hinge, however, is strikingly different from that of any hitherto-known bivalve. The teeth form a series of elongate ridges disposed fan-wise, radiating from the umbo, and it is difficult to distribute them satisfactorily into cardinal and lateral. The author considers that eight may be reckoned as cardinal and three (or more) as posterior lateral. His figure shows thirteen of these ridges in all. Another interesting feature of the shell is the very prominent external umbono-postero-ventral ridge, which at its point of origin at the umbones is raised into a sharp keel but becomes less and less prominent as it passes outwards. It reminds one of the similar keel in *Hemicardium*.

GRAVITY SURVEY OF KWANTO.—The recent issue (No. 2) of vol. 4 of the *Japanese Journal of Astronomy and Geophysics* is wholly devoted to a report of a gravity survey using an Eötvos variometer, of the Kwanto district, which suffered a great earthquake on Sept. 1, 1923. The district has since been investigated along many lines of geophysical research: land and hydrographic surveys have shown that the vertical displacements of the bottom of the Bay of Sagami, resulting from the earthquake, are more than a hundred times those of the land. In the present gravity survey, by N. Kumagai, 76 points were occupied, and the observations are carefully discussed and corrected for various sources of error, though further corrections are to be embodied in a later report. Unfortunately, few gravity observations dating from before the earthquake are available for the district, so that the observations of the present survey cannot be used to infer changes of density distribution resulting from the earthquake.

POSITIVE THERMIONS.—The May number of the *Journal of the Franklin Institute* contains an account by Dr. G. H. Kunsman of the 'iron catalyst' source of positive ions of the alkali and alkaline earth metals. Its great advantage is that the mixture from which the ions are produced can be mounted on a filament and used in a high vacuum. The source is, moreover, steady and not readily exhausted, whereas most of the older methods of producing positive ions either required the presence of gas or gave an emission which fell off rapidly with time. Dr. Kunsman has been able to show that the temperature variation of both the positive ion current and the electron current from a given specimen is in accord with the Richardson

equation, and that the energy needed to remove a positive ion from the surface is consistently less than that required by an electron. It seems probable that metal diffuses to the surface in much the same way as thorium does in the heat treatment of a thoriated filament. The ions have been analysed at Princeton by means of the mass spectrograph and have been shown to be singly charged atoms, and they have already been applied in the same laboratory to the study of the secondary emission of electrons when metal plates which have been thoroughly freed from gas are bombarded with positive ions.

THE BURNING OF CARBON DISULPHIDE.—It has been shown by H. G. White that the addition of small quantities of the vapours of ether, benzene, acetone, and formaldehyde to mixtures of carbon disulphide and air causes a pronounced contraction in the range of flame propagation, especially at the lower limit. The results of further work on this subject are published in the *Journal of the Chemical Society* for April 1927. The present results are in general agreement with former work, and indicate that the added substance appears to act in three ways: (1) it alters the thermal constants of the mixture; (2) it alters the percentage of oxygen in the mixture; (3) it produces a specific catalytic effect. Of these, the catalytic effect is the most important and varies enormously from substance to substance. The order of efficacy of certain substances in preventing the propagation of flame at the limit in mixtures of carbon disulphide and air given by White differs from that found by Dixon.

DECOMPOSITION OF COAL.—Technical Paper No. 16 on fuel research (London: H.M. Stationery Office, 9d. net) records observations by J. G. King and R. E. Willgress of the Fuel Research Station, on the "Primary Decomposition of Coal." The temperatures of initial decomposition of fuels were found to range from 140° C. for peat to 215°-245° C. for bituminous coals. For these coals the temperature of initial decomposition appeared to increase with decrease in carbon content, and to increase with increasing oxygen content. The evolution of moisture is a gradual process, but the first acceleration of moisture evolution coincides with the appearance of oil vapour. The temperatures observed are somewhat lower than those recorded by previous workers, and deserve consideration in connexion with all processes or researches involving heat treatment of coal in the region of 200°-300° C., in which the possibility of chemical change must never be overlooked.

DOPES AND DETONATIONS.—The second report on dopes and detonations (Aeronautical Research Committee: Reports and Memoranda, No. 1062 (E. 23), London: H.M. Stationery Office, 1927. 1s. 3d. net) has recently been published. The investigation which the report describes has included an experimental and theoretical study of low temperature oxidation of liquid fuels in air, in conjunction with engine experiments to determine the relationship between detonation and observed chemical action. The conclusion drawn from the experiments is that detonation in paraffin fuels and ether is due to the accumulation of peroxides in the nuclear drops during rapid compression. These drops ignite simultaneously when the detonation temperature of the peroxide is reached. The amount of peroxide formed would not in itself be sufficient to cause the detonation observed, but acts as a primer by simultaneous ignition of the nuclear drops. The metallic dopes act by reducing the peroxides as fast as they can be formed, and preventing their accumulation, thus delaying the ignition of the drops.

'HAVEG.'—In the *Chemiker-Zeitung* for May 11 there is an account of the use of 'Haveg,' an artificial resinous material like bakelite, for the manufacture of large pieces of chemical apparatus without the use of an iron core or other reinforcement. Vessels can be constructed in one piece and without seams, up to 2.6 metres in diameter. The thickness of the walls varies from 10 mm. to 40 mm., and the vessels can withstand sudden alterations in temperature up to 130° C. Since the specific gravity lies between 1.6 and 1.8, the apparatus can be handled easily; moreover, breakages can be repaired inexpensively. During the hardening process the resin shrinks considerably, so that some difficulty is experienced during manufacture, if it is desired to combine it with metal. This difficulty has been overcome by constructing the inner vessel of perforated sheet metal, the perforations of which become filled with the resin, which when hard forms knobs or studs serving to bind the outer casing to the inner one.

RADIOLOGICAL APPARATUS.—The latest (1927) edition of Messrs. Newton and Wright's catalogue of apparatus for radiology describes in a brief but quite adequate way the various types of apparatus they make for radio-diagnostic, radio-therapeutic and X-ray research purposes. The closed circuit transformer has been developed for many years by this firm, and they are now able to build these machines for 250 kilovolts rectified three-phase output, giving practically continuous high-tension current without the introduction of condensers. Considerable prominence is given among the illustrations to the types of 'Metalix' tubes which are now available for medical and other purposes. This tube is, we understand, becoming largely used in medical work, its handiness of form being a great feature in its favour.

ELECTRODE STEAM GENERATORS.—The importance of having a uniform load on an electric power-station is well known to electrical engineers. If there is a large demand for a short period every day, the station must have sufficient plant to carry over the peak load, and this means that a number of machines are lying idle during nearly all the day, and so the overhead costs are large compared with the revenue. Engineers do their utmost, therefore, to secure a level load. For example, they often supply energy at a much cheaper rate during the night when the demand is small. To take advantage of this, electrode boilers are sometimes used which store the electrical energy delivered during the cheap period of supply as heat, either by heating water or converting it into steam. In the Bulletin for March of the Oerlikon Co. of Zurich, there is a description of electrode steam generators for electric pressures varying between 3000 volts and 8000 volts. One of the hospitals in Basle obtains steam and hot water for the kitchen and the laundry in this way. Two similar boilers each for 1000 kilowatt, 6000 volts, have been ordered for an installation in Great Britain. In Switzerland, where sometimes only a limited amount of electric power obtained from waterfalls is available, it is a boon to use these devices and so eliminate chimneys and smoke and avoid the necessity of coal storage room. The cost of maintenance of these electrode steam generators is very small. The equipment works as a star connected plant, with the boiler itself acting as the neutral point. It is therefore safe to have in a building. Tests on a high-tension boiler for 1200 kilowatts and 6400 volts have shown that the efficiency of the boiler can be as high as 98 per cent. We think that these electrode steam generators can in many cases be advantageously used.