Research Items

Late Bronze Age Site in West Suffolk

FURTHER exploration of the fenland area carried out by the Fenland Research Committee in March, 1935, throws light on the character of the invasive movements associated with the 'Deverell Rimbury' pottery during the Late Bronze Age in Britain. The site examined, upon which a report has been drawn up by the secretary, Mr. J. G. D. Clark (*Antiquaries J.*, 16, 1), is situated in the north-east corner of a field in Mildenhall Fen, West Suffolk, about a mile from the chalk. This field, recovered for agriculture not long before 1829, was ploughed for the first time for many years in 1935, when quantities of bones, flints and sherds appeared on the surface. A section of a sand-hillock, fifteen feet wide, was opened up. A circular hole 1 ft. deep found in undisturbed sand near the top of the hillock contained an interesting group of pottery, a few bone fragments and a mass of whitish material. The majority of the finds was recovered from the lower slopes of the sand ridge, where there was a well-defined culture stratum with masses of wild and domesticated animal bones, flints and sherds, as well as charcoal. It overlay dirty grey sand and was sealed by peat. The pollen and charcoal identifications show a marked predominance of alder, pointing to the wet conditions which had necessitated settlement on the higher ground at the edge of the fen. The pottery falls into seven groups, with affinities to the 'Deverell-Rimbury' types, and belongs unquestionably to the invasive element of the Late Bronze Age, though certain features illustrate contact with native people, presumably of the Middle Bronze Age, thus eliminating the interval postulated by Sir Cyril Fox. One group, the 'Mildenhall Ware', has no immediate parallels, but its general similarity in decoration to many late beakers from south-east Britain may, it is suggested, point to a belated beaker influence, which possibly will prove quite local in distribution. The site also yielded the first really extensive flint industry of the period.

Calendrical Correlation in Central America

THE evidence relating to the names of the months and days and the corresponding hieroglyphic signs in use among the ancient inhabitants of Central America has been reconsidered by Dr. O. D. E. Bunge (*J. Soc. Américanistes*, N.S., **27**, Fasc. 1). The point of departure of his argument is that the calendar was the invention not of the Maya or the Quichua, but of the third element in the population, the Tzental people. Although these people have left behind them neither monuments nor important documents, archæologico-geographical considerations, legends and linguistic evidence point in this direction. The late E. Seler, who also investigated the Tzental calendar, endeavoured to explain it by the Mayan calendar, instead of vice versa, and overlooked the fact that there had been a shifting of the date of the winter solstice, with which the year begins, as between the records of the two systems, owing to the lack of intercalation. Hence his correlations fail. On the evidence of etymology and the hieroglyphic signs, the names of the twenty days in the Tzental system are identified as signifying a primitive god, who is the origin of all things; five celestial gods—the sun, the new moon, the morning star (Venus), the evening star (Venus), the constellation of the polar star; two gods of death; four gods of the elements—wind, water, rain and the god of thunder and earthquake; two gods of Nature—one of the months and living things, the other of inorganic Nature; the god of war; the god of drunkenness; and three oracles. The order suggested does not agree with that of Nuñez de la Vega. The identification of the months is based on the sequence of the operations in the Tzental agricultural year, beginning with the winter solstice and ending with in order the month of harvest, the month of the first cold weather, and the month of the annual ritual ceremonial.

Sodium Chloride Deficiency in Man

IN some experiments described by R. A. McCance (*Proc. Roy. Soc.*, B, **119**, 245; 1935) more than twenty per cent of the total sodium chloride was removed from the bodies of three living subjects, by exposing them to radiant heat and so inducing sweating. The water lost in this way was immediately replaced by drinking. This deprivation led to aberrations of flavour, cramps, weakness and severe distress on exertion. The concentration of sodium chloride in the blood was diminished but the concentrations of hæmoglobin and serum protein were increased. The blood-urea was increased. (See also NATURE of February 8, p. 246.)

Marine Fishes of West Africa

IN "The Marine Fishes of West Africa" (*Bull. Amer. Mus. Nat. Hist.*, **70**, Pt. 1, 1936), Dr. Henry Fowler has attempted a comprehensive account of the fishes and fish-like vertebrates from the coast of western tropical Africa, based on material collected by the American Museum Congo Expedition, 1909–1915. According to this author, "the great homogeneity of this vast faunal region makes it evident that its influence extends somewhat beyond the confines of Africa proper", and he has found it desirable to include in his survey the outlying islands of the Madeiras, Canaries, Ascension Island and St. Helena. This very extensive work gives evidence of having been, in places, somewhat hastily compiled or inadequately checked. The illustration of *Scyliorhinus caniculus*, for example, suggests either that the drawing of another fish has been inadvertently inserted over this name or that the members of this species inhabiting West African waters are so different from typical specimens of *S. caniculus* as to justify their being placed in another genus.

Sperm Differences in Rodents

IN the course of an investigation of the sperm structure in the different rodents of the family Muridæ, G. F. Friend (*Quart. J. Micro. Sci.*, **78**, Pt. III; 1936) has shown that those of the Murinæ differ from those of the Microtinæ. Both sub-families have sperms with a hooked head—a highly specialised type—with a striking exception in each, namely,

Micromys agrarius, the harvest mouse, and *Ondatra zibethica*, the musk-rat. These both have a simpler non-hooked type which is possibly more primitive since it is similar to that in less specialised groups of rodents. The nucleus within the head is of a curious hook-shape in the Murinæ whereas that in the Microtinæ is recessed. The sperm of the long-tailed field mouse, *Apodemus sylvaticus*, is different from that of De Winton's field mouse, *A. flavicollis*, which certainly supports the modern view of regarding them as distant species and not merely varieties as was formerly done. Since the sperms are specifically distinct and exhibit also generic types, it is possible that their examination may prove of value in detailed systematic studies. A clear account of the detailed structure of the head of the muride sperm with a suggested nomenclature is provided.

Insects of the Dutch East Indies

Two fascicules have recently come to hand dealing with certain groups of insects collected during the expedition of His Royal Highness Prince Leopold of Belgium to the Dutch East Indies. The publication of the scientific results of this expedition is being undertaken, in the form of a series of sumptuously executed memoirs, by the Royal Natural History Museum of Belgium. Fascicule 11 is concerned with the Coleopterous families Chrysomelidæ (by Mr. S. Maulik), curculionidæ (by Sir Guy Marshall) and Tenebrionidæ (by Herr H. Gebien). The contents of Fascicule 12 form accounts of those moths grouped under the Pyralidæ (by Prof. A. J. T. Janse) and the Heterocera (by Mr. W. H. T. Tams). In the last-mentioned contribution a number of miscellaneous families are dealt with. In view of the new species described, these memoirs are important for systematists as well as students of geographical distribution.

Bubbles from Water Plants as a Measure of Photosynthesis

F. GÓRSKI has recently given a valuable discussion of a very old method of measuring photosynthesis (*Bull. International de l'Acad. Polonaise des Sci. et des Lettres, Classe des Sci. Math. et Nat.*, Sér. B.: Sc. Nat. 1, No. 4–7 BI, 1935). The bubbles released from green water plants in sunlight, and especially from *Elodea*, have long been utilised for this purpose, though of recent years more and more critical examinations have been made of these methods, of which the value remains in their simplicity. Dr. Górski examines the extent to which the oxygen released in photosynthesis is present in the bubbles emitted. The conclusion is a little startling; of the oxygen emitted in photosynthesis, 70 per cent usually diffuses in water (this result is shown to be naturally explained by leaf anatomy, when most of the chloroplasts face a wall away from an intercellular space), but when assimilation is more intense, comparatively more oxygen escapes in the bubbles. One surprising result of this investigation is to support the view that the volume of the bubbles is a more accurate index of the amount of assimilation than is the measurement of the oxygen released. Only some thirty per cent of the oxygen released in photosynthesis is present in the bubbles; but as the gaseous nitrogen released compensates to some extent for the photosynthetic oxygen released in solution, the volume of the bubbles usually represents an equivalent of seventy per cent of the total oxygen. This compensation theory of the bubble method was advanced to justify it many years ago by Godlewski, but as the result of some 260 analyses in the course of the present work, the bubble-counting method can only be granted a strictly limited utility. Many teachers will find in this paper some justification of their inability to do as the text-books usually suggest and "ignite a glowing splinter" in the gas collected from the bubbles rising from *Elodea*.

Serological Studies of Plant Viruses

THE highly specific immunological reactions of the mammalian body have been used by Jorgen M. Birkeland to differentiate the plant viruses known as cucumber mosaic, tobacco ringspot and tobacco mosaic ("Further Serological Studies of Plant Viruses", *Ann. App. Biol.*, 22, No. 4, 719–727, Nov. 1935). It was not, however, possible to distinguish serologically the viruses of tobacco mosaic, aucuba mosaic and tomato streak. The paper offers further evidence that viruses are themselves antigenic, and the effects of the host plant antigen have been eliminated so far as possible by estimating the precipitin reactions of the several viruses from serologically unrelated plants. A determined attempt to isolate a soluble specific substance has not been successful; but the methods used are very interesting, and are set forth in the paper.

Natural Decomposition of Lignin

A VERY useful critical summary of recent work upon this subject has been prepared by Dr. A. G. Norman of Rothamsted Experimental Station (*Sci. Prog.*, **30**, No. 119, Jan. 1936). He points out that there is general agreement that lignin is one of the most resistant of all plant materials to natural processes of decay; but that it is attacked particularly by the mycelium of various basidiomycete fungi. At the same time, most divergent statements as to its rate of decomposition under both aerobic and anaerobic conditions are probably to be traced to the different methods used to isolate and estimate the residual lignin. Most methods rely upon the removal of other carbohydrates by comparatively strong acid reagents, and suffer from the fact that pentoses, which are practically always associated with the material containing lignin, tend to condense to insoluble black precipitates in contact with these strong acids and thus may add materially to the residue estimated as lignin. This difficulty may be avoided by previous removal of the pentose constituents by digestion with dilute acids, although it remains a matter of speculation how such predigestion processes affect the lignin. A more difficult problem is probably presented by the fact that most decomposing plant materials will also contain proteins and, when the lignin residues are obtained by digestion with strong acids, nitrogen undoubtedly links on to the lignin nucleus from the protein compounds. No calculation, by an arbitrary figure, based on the nitrogen in the lignin, can allow for this, as the size of the molecule introduced with the nitrogen is quite unknown although it is undoubtedly not a protein. Dr. Norman's paper thus makes clear the many difficulties in the way of interpretation in a field that interests those concerned with decay in the soil, with timber preservation and with the more remote results of those processes which are linked with the problems of the nature of the plant remains preserved as fossils in the older rock strata.

The Archæan Complex of Mysore

THIS was the subject of the presidential address by Dr. B. Rama Rao to the Geological Section of the twenty-third Indian Science Congress held at Indore on January 2–8 (Calcutta: Asiatic Society of Bengal). The Dharwar System and the associated granites have long been a source of controversy, and many rocks formerly thought to be igneous are now definitely known to be of sedimentary origin. According to the new classification the sequence is interpreted as follows: *Lower Dharwar*—Greenstone, keratophyre and quartz-porphyry schists, intercalated with mica-chlorite schists, ferruginous cherts and granulitic limestones, with contact metamorphosed equivalents including hornblende schists, eclogites and amphibole-iron-ore-quartzites. *Middle Dharwar*—Conglomerates, quartzites, pelitic schists, limestones, dolomites and banded hæmatite-quartzites, with contact metamorphosed equivalents including kyanite-staurolite schists and pyroxene-granulites. These are followed by intrusions of granite, granite-porphyry and granodiorite, many of which are gneissose. *Upper Dharwar*—Crumpled shales, sandstones and brecciated hæmatite-quartzite and other ferruginous sediments. The Closepet granites follow, consisting of slightly foliated pink and grey types which are only rarely hornblendic. Correlations with North American Pre-Cambrian formations from Keewatin to Upper Huronian are suggested tentatively, the two periods of granitic intrusion being paralleled with the Laurentian and Algoman granites respectively. In the absence of confirmation by lead-ratios, however, such long-range correlations are not practicable, especially as it is already known that in Canada and Russian Karelia there are intrusions dating back to 1,800 million years ago, far beyond the 1,000–1,100 million years usually assigned to the Laurentian granite-pegmatites.

Pulsation of Climate

A. H. R. GOLDIE has recently discussed a pulsation of climate that has been in evidence over the northern parts of the British Isles during the past thirty years (*Quart. J. Roy. Meteor. Soc.*, Jan. 1936). This pulsation came to light through a study of the variations of the differences of atmospheric pressure between certain pairs of observing stations in the north. These differences, when averaged for any period, are rough measures of the average strength of the component of the wind at right angles to the line joining the two stations. It was observed that when the stations lay nearly along a line of longitude, that is, when the difference of pressure measured the westerly component of the wind, maxima occurred with fair regularity about every four years. This discovery led to an examination of the weather associated with different stages of the cycle. Charts were prepared showing the mean deviation of atmospheric pressure from normal throughout the British Isles for the years of maximum westerly component of wind and also for years midway between two such maxima. It was found that in the former case pressure was above the average in all parts of the British Isles but especially from the south-west across to eastern England, an arrangement suggestive of a prolongation of the normal Azores anticyclone towards and over the British Isles. In the latter case (weak westerly component) mean pressure was everywhere low; there was a belt of maximum negative deviation across Scotland and a slight trough extending from it towards south-east England. As regards temperature, sunshine and rainfall, calling those years of strong westerly component and high pressure H years and those of weak westerly component and low pressure L years, it was found that the H years were very consistently warmer, sunnier and drier than the L years. The duration of winds of gale force was greater in the L years, as was the exchange of air between low and high latitudes in the neighbourhood of the British Isles. Mr. Goldie stresses the point that he was not trying to establish the existence of a regular permanent periodicity of nearly four years in our climate, although he had occasion to refer to a periodicity of 3·8 years in atmospheric pressure found more than thirty years ago by Lockyer for India, Australia and South America.

Studies in Spark Formation

AN account of experiments by U. Nakaya and F. Yamasaki on the initial stages of spark formation in a Wilson cloud chamber has recently appeared (*Proc. Roy. Soc.*, A, February). A potential was applied to the gap, the chamber was expanded, the spark was initiated by a flash of ultra-violet light, and the chamber was then illuminated. Clouds showing the characteristic formations were obtained for a number of gases. It was found that traces of certain organic vapours were very effective in changing the branched positive streamers, characteristic of the discharge in air, into a smooth track.

Road Vehicle Performance

THE latest of the publications issued by the Association of Engineering and Shipbuilding Draughtsmen ("Road Vehicle Performance", by R. W. Collins. The Draughtsman Publishing Co., Ltd. 2*s*. net) deals with the simple mechanics of the movement of motor vehicles—the connexion between the engine power, the speed, and the various resistances of motor-cars, and the influence of dimensions, road condition, etc., on their operation. The book can be read with understanding by anyone able to appreciate the simplest mechanics. Motorists have recently been particularly interested in stream-lining, and will here find a section dealing with air resistances in which values are given of the coefficients for several types of vehicle, and an appropriate set of curves. From these it is possible to judge how much or how little is to be gained by stream-lining in the case of familiar types of car at ordinary speeds. Unfortunately the author is not always scrupulously careful in the statement of his formulæ and in the use of the most direct form of expression, and thus involves himself and his reader in some difficulty. The first formula which appears is misstated and a symbol R, which has no right to a place there, is ultimately eliminated by a kind of mathematical legerdemain. The reader will recognise that such faults are due to insufficient checking and criticism, for the author in the end makes the meaning of each section quite clear. The subjects he deals with are transmission efficiency, tractive effort and the several resistances met with, horse-power required, acceleration and accelerating force, and the advantages of the oil engine. The paper concludes with a note on adhesion, the understanding of which would greatly help drivers to appreciate different road conditions, and a typical form of analysis of the performance of one particular vehicle an analysis which could without difficulty be applied to any other.