Research Items

Palæolithic Succession in England

MR. T. T. PATERSON has inaugurated a study of the palæolithic succession in England with an examination of finds at Barnham St. Gregory (*Proc. Prehist. Soc.*, **3**, 1; 1937). This site, a pit from which brick-earth has been dug, is situated in a small shallow valley running parallel to the Little Ouse near Cambridge. It was discovered in 1933, but implements had been found there previously on several occasions in the brick-earth. The implements now under consideration are found in the gravels and sands, with intercalated beds of clay and silt, in all more than sixty-four feet deep, which underlie the brick-earth. *Coups de poing* were found in the brick-earth, three feet above the gravel surface. In the implements, six industries, five from the gravels, are distinguished by geological horizon, state of wear and platination, and typology. Industry *A*, the earliest, is heavily rolled and battered and deeply patinated. It is found at depth in the gravels, whereas the others are confined to the top layer. These latter are distinguishable by their depth in the gravel and their patination and wear. Both *A* and *B* have suffered from the effects of solufluxion. The sixth industry comes from the brick-earth and is essentially Acheulean, whereas the earlier gravel industries are flake implements. More than 1,500 implements have been taken from the pit, apart from those of tabular flint and rejects. Here then at Barnham is a series of industries showing progressive development along indigenous lines uncontaminated by contact with other cultural techniques. It belongs neither to Clactonian nor proto-Levalloisean; and it is suggested that it be called the Barnham sequence of the Clactonian.

Origin of Tuberculosis and Nature of the Tubercle Bacillus

TUBERCULOSIS in man and animals is almost universally regarded as being caused by infection with a parasitic bacterium, the tubercle bacillus. Prof. J. Tissot, professor of general physiology in the Muséum national d'Histoire Naturelle, Paris, combats this view in an elaborate histological study of tuberculous tissues ("Constitution des Organismes, Animaux et Végétaux: Causes des Maladies qui les Atteignent". Vol. 2, Cause et Nature de la Tuberculose. Paris, at the Muséum, 7 Rue Cuvier: 1936). He maintains that the tubercle bacillus is not a rod-shaped organism (bacterium), but is a dumb-bell-shaped structure derived from embryonic cells in the tuberculous nodules. Tubercle bacilli, according to his view, are the mitochondria of these cells, and so-called cultures of tubercle bacilli are in reality cultures of these mitochondria. Prof. Tissot believes that he has established the fact that tuberculosis develops spontaneously in the individual, and is not usually the result of contagion. He does, however, speak of the 'tuberculous mitochondria' as being a *virus*, and it is not clear from his monograph in what manner he considers cultures of the so-called tubercle bacillus of the bacteriologist act in inducing tuberculosis, as they certainly do, when inoculated into a susceptible animal.

Embryology of the Ferret

IN a previous paper, W. J. Hamilton dealt with the early development of the ferret from fertilization to the formation of the prochordal plate. A recent communication (*Trans. Roy. Soc. Edin.*, **59**, (1), No. 5, 1937) carries on the investigation from that point up to the formation of the notochord and the mesoblast. The work is based on a full series of blastoderms from the appearance of the primitive streak up to the formation of seven somites, and in the interpretation the experimental work on Amphibia and Aves has been taken into consideration. The mesoblast differentiates from the ectoderm at the hinder end of the disk and no contributions are made to it by Henson's knot, the notochordal process or the prochordal plate. The anterior end of the differentiation of the primitive streak ceases when Henson's knot appears a short distance in front of it and thereafter it only grows by additions at its hinder end. The downward growth of Henson's knot fuses with the underlying endoderm.

New Species of Mysidacid Crustaceans

PROF. WALTER M. TATTERSALL describes some interesting new mysids ("Reports on the Collections obtained by the first Johnson-Smithsonian Deep-Sea Expedition to the Puerto Rican Deep". Johnson Fund. Smithsonian Miscellaneous Collections, **91**, No. 26; 1937. Pub. 3413). In addition to the new species, the rare *Lophogaster longirostris*, *L. spinosus* and *Petalophthalmus oculatus* are recorded. A key is given to the species of the genus *Paralophogaster* and a new species *P. atlanticus* added, which differs from *P. glaber*, the type of the genus, in the eyes, antennal scale, rostral plate and telson. All these Atlantic species are closely related, and it is a question whether *P. macrops* described by Colosi from the Red Sea may not be a young form of *P. glaber*. *Gastrosaccus johnsoni* n.sp. is peculiar in its male pleopods, which are very distinctive, especially those of the second and third pairs, and at once distinguish the species from all others of the genus, the females differing only in minor characters.

Asiatic Flower-Birds and American Bird-Flowers

IN the warmer regions of Africa, Asia and America, many flowers are pollinated by birds. In America the birds visiting the flowers are mostly humming birds which hover as they drink the nectar; in Asia the birds climb over the branches and extract the nectar when in a hanging or sitting position. W. L. Van der Pijl has therefore spent some time examining the efforts of the sun birds (Nectariniidæ) and white-eyes (Zosteropidæ) to visit American bird-flowers introduced into Java (*Ann. du Jard. Botanique de Buitenzorg*, 48, Pt. 1; 1937). The original paper must be consulted for details; but, as might be expected, though often visited by the birds, most of these flowers remain sterile; in many cases the calyx or corolla tube has been punctured to enable access to be obtained to the nectar.

Insolation and Relief

THE indirect importance of relief in mountain regions in determining the distribution and intensity of sunshine on different slopes is demonstrated for selected alpine valleys in Switzerland and Austria in a monograph entitled "Insolation and Relief" by Miss A. Garnett (Publication No. 5. The Institute of British Geographers, 1937). From values assessed for sun altitude and direction, valley azimuth and degree of slope, maps and graphs are constructed for the two solstices, the equinoxes and days in early and late summer. The features which they portray are correlated closely with field studies giving details of land utilization, upper limits of crop production, and the distribution of permanent settlements. The results suggest that long duration rather than high intensity of insolation is the factor of most importance geographically, both in determining the upper limits and distribution of cereal cultivation and the position of permanent winter settlements. It is also shown that at some seasons of the year *ubac* (north-facing) slopes that are generally assumed to have low duration of sunshine, in actual fact may have a longer duration than the *adret* (south-facing) slopes, notably in the critical periods of early and late summer. This helps to explain what otherwise seems to be an unusual distribution of habitations and of cultivations in the valleys selected for study.

Crust Displacements in Japan

SERIES of re-levellings recently made in Japan show that, in many districts, chronic crustal deformations are now taking place. In order to study the connexions between such movements and the occurrence of earthquakes, revisions of the levelling have been made in various parts of the country, and especially in 1936 in the southern island of Kyûshû. A comparison between these measurements and those made, for the most part, about forty years ago, has been made by Prof. N. Miyabe, to whom we are indebted for much useful work of the same nature (*Proc. Tokyo Imp. Acad.*, **13**, 257–260; 1937). The island is almost bisected by an east-west line between Udo and Nobeoka. In the northern half, the general movement is a tilting of the crust towards the north, the northern end having subsided relatively by about 7 in. To the south of the median line, from Udo to Minemata, the crust has risen as a whole, but, to the south of the latter place, the displacements show marked fluctuations, so that the curve representing them consists of segments of lines. In other words, the movements recorded are those of crust-blocks rather than of the island mass as a whole.

Potential of the Iodine Electrode

THE normal potential of the mercury-mercurous iodide electrode, previously known only by calculation, has been determined by R. G. Bates and W. C. Vosburgh (*J. Amer. Chem. Soc.*, **59**, 1188; 1937). The cell consisted of a mercury-mercurous iodide electrode, with electrolytes of potassium iodide and hydrochloric acid, or potassium iodide, acetic acid and sodium acetate, combined with a hydrogen electrode. The E.M.F. values were extrapolated by an equation involving the activity coefficient of hydrochloric acid. In a second series of cells the electrolyte consisted of potassium iodide, sodium acetate and acetic acid, and the extrapolation now involved the molality of unionized acetic acid. The two sets of values were in good agreement, extrapolation to infinite dilution giving the value $E^{\circ}_{25} = -0{\cdot}0405$ volt. By combining this with the value of the electromotive force of the cell consisting of lead amalgam, lead iodide, mercurous iodide and mercury, a value for the normal potential of the iodine electrode could be calculated. This was found to be $E^{\circ}_{25} = -0{\cdot}5356$ volt, in better agreement with the value given by Lewis and Randall, namely, $-0{\cdot}5357$ volt, than that in the International Critical Tables, $-0{\cdot}5345$ volt.

The β-rays from Lithium and Boron Isotopes

THE radio-elements ^{8}Li and ^{12}B, obtained by bombarding lithium and boron with fast deuterons, give β-rays with energies up to 12 million volts. D. S. Bayley and H. R. Crane (*Phys. Rev.*, **52**, 604) have investigated the upper energy limits of these spectra, and J. J. Turin and H. R. Crane (*ibid.*, 610) have used the elements as a source in a study of the energy loss of energetic electrons in lead and carbon plates. The β-rays were investigated by a cloud-chamber in a magnetic field, the target being bombarded with deuterons immediately before the expansion. Both β-ray spectra have by inspection upper limits at $12{\cdot}0 \pm 0{\cdot}6$ Mev. Since the masses of the atoms involved in the formation and disintegration of ^{8}Li, ^{12}B, are known, the spectra may be used for testing the validity of the theoretical formulæ of Fermi and of Konopinski and Uhlenbeck for the shape of the upper limit. The question is complicated by the fact that protons are produced with unknown energy in the formation of ^{8}Li and ^{12}B; but accepting indirect evidence for the energy of these particles from the excitation functions, it is found that the Konopinski-Uhlenbeck theory gives considerably too high extrapolated values for the maximum energy of β-emission. The energy loss of β-particles up to 11 Mev. going through carbon is in good agreement with the Bethe-Heitler theory, the loss in lead is more than 50 per cent greater than predicted, but much of this difference is to be accounted for by the scattering of the electrons in the lead, which causes the path in the metal to be considerably greater than that directly measured.

Physical State of Jupiter's Atmosphere

ABOUT three years ago, Dr. H. Jeffreys suggested that Jupiter was composed of a rocky core surrounded by a thick layer of ice, the latter being covered by an atmosphere with a depth of more than 6,000 kilometres. Mr. B. M. Peek (*Mon. Not. Roy. Astro. Soc.*, **97**, 8, June 1937) suggests that such an atmosphere cannot exist, his method being an examination of an adiabatic model, an isothermal model, and finally an intermediate model which is a compromise between the first two. For the purpose of numerical evaluation, in the adiabatic and isothermal models the atmosphere is considered to be methane, and in the case of the intermediate type different proportions of hydrogen and methane are taken, and pressure-depths curves are drawn which show the depth at which the solid state is reached. If the atmosphere were composed of pure methane, this depth would be only about 35 km., and if pure hydrogen it would be 270 km. Whatever model be adopted, the depth of the atmosphere is probably limited to about 1 per cent of the radius of the planet. Mr. Peek directs the attention of meteorologists studying Jupiter to the fact that great densities are rapidly attained in the atmosphere, which would almost certainly lose its familiar characteristics below a depth of 25 km.