Research Items

Ancient Man in Devon

THE implementiferous gravels at Broome, Dorset (the gravels in question are actually over the county boundary in Devon), have long been famous. Chert implements were discovered there in 1877–78. Mr. Reid Moir has now investigated these gravels and the contained implements in the light of the knowledge of quaternary deposits and 'palæolithic' implements which has accrued since the gravels and implements were originally described (*Devon Archæol. Exploration Soc.*, 2; 1937). The gravels were regarded in earlier investigations as laid down by normal river action; but it cannot be questioned that, during the Ice Age, Devon, so near the main terrain of the glaciers, must have been affected by the tremendous happenings of the period. The deposits must therefore be regarded as laid down by an abnormal flow due to the melting ice. It would appear that some twenty feet of the deposit was laid down as a result of the passing away of glacial conditions. Then comes about four feet of comparative quiescence, in which palæolithic hunters may have lived on the river bank. Another period of very active deposition follows in which the uppermost thirty feet of gravels was laid down. This is only vaguely stratified, or 'tumbled'. The archæological evidence fits in with this hypothesis. The specimens from these deposits can be classified as (*a*) primitive, possibly eolithic, implements, much rolled and abraded; (*b*) one or two early Acheulean hand-axes showing signs of transport; (*c*) Late Acheulean hand-axes, fine and unabraded; (*d*) Clacton III material unabraded; (*e*) some Levallois flakes, but not a definite Levallois industry. There can be no doubt that the middle layer was laid down in Late Acheulean and Clacton III (High Lodge) times. The Broome deposits fall in line with the 100-ft. terrace of the Lower Thames Valley, Derby Rd., Ipswich, and Hoxne, Suffolk. The lower deposit of Broome, therefore, is connected with the glaciation of the Kimmeridge Chalky Boulder Clay and the uppermost with the Upper Chalky Boulder Clay; while there is strong evidence for correlating the upper gravels with the deposit of 'clay with flints' of East Devon on the Bere–Seaton Road, a site which Mr. Reid Moir also discusses.

Mesolithic Flints from West Hartlepool

Finds of worked flints from the submerged forest at West Hartlepool, which have the appearance of an early stage of the Maglemose culture, or possibly even more primitive and suggestive of that of Duvense, Lübeck, have been recorded by Dr. C. T. Trechmann, Mr. A. S. Kennard adding a note on the Mollusca (*Proc. Prehist. Soc.*, July–Dec. 1936). The submerged forest is situated between Hartlepool and West Hartlepool and along the coast southward to Seaton Carew. The main portion occupies a depression between two outcrops of magnesian limestone. A mammoth tusk, antlers of red deer and Irish elk, and other mammalian remains have been found beneath the deposit. A rough but well-chipped pick-like flint implement, now in the Sunderland Museum, was found "on the turf of the buried forest" at Seaton Carew in 1860. In 1934–35, flint flakes and chippings and a fresh shell of *Littorina littorea* were found at West Hartlepool near the base of the peat, while a patch six feet long and three feet wide yielded a quantity of very sharp implements and chippings of very black flint with white chalky patches and streaks. These appear to be the work of one person thrown down together. The fifty specimens, all found at the junction of the underlying blue clay with the peat, included a number of elongated micro flakes, a microlith blunted down one edge, a micro-burin and a broken, asymmetrically notched flake, probably a microlith in process of manufacture. In the peat itself are found indefinitely chipped flints of an elongated shape, not easy to comprehend, but in certain characters recalling the pick in the Sunderland Museum. It seems possible that two periods are represented, one at the base and the other higher up in the peat. The peat is very compressed and contains birch, hazel, *Equisetum*, iris, etc. Permeation by drain refuse makes pollen analysis unsatisfactory. The period is early Littorina or Atlantic. The worked flints are of Maglemose type, and a comparison with other sites of the submerged forest regions of the Yorkshire, Durham and Northumberland coasts suggests that the worked flints found at Skipsea are of like appearance.

Inactivation of Adenosine by Blood

ALL tissues of the body contain in greater or less amounts adenosine or allied compounds, substances which, when they enter the blood-stream, have far-reaching physiological effects. The existence of enzyme systems in the tissues capable of inactivating these substances has been known for some time, but up to the present no such enzymes in the blood have been described. Drury, Lutwak-Mann and Solandt (*Quart. J. Exp. Physiol.*, 27, 215; 1938) have now demonstrated the presence in the blood plasma of the ordinary laboratory animals and of man of an enzyme inactivating adenosine, probably by deaminating it to form the biologically inert substance inosine. Cat's plasma is by far the most active, 0·1 mgm. of adenosine being destroyed in so short a time as 2 min. by 1 c.cm. of plasma. This very high degree of activity is, however, exceptional and is only reached on account of the remarkable fact that the activity of the plasma of anæsthetized animals gradually increases during an experiment, until 5–6 hours after the beginning of an experiment it may be 12 times the normal value. Although this increase appears to be accelerated by a fall of blood pressure, the authors are unable to correlate it directly with this, and it appears to be unconnected with the presence of any particular organ. The authors suggest that the increase in enzyme activity may be due to the formation of more enzyme from inactive plasma protein.

Larvæ and Pupæ of Aquatic Diptera

MEMOIR 205 (1937) of the Cornell University Agricultural Station is written by Prof. O. A. Johannsen and forms Part 3 of a series entitled "Aquatic Diptera". In the present case, the single family Chironomidæ is dealt with and, in particular, four out of five of its sub-families. The Chironominæ are

the family left out to be dealt with in a subsequent memoir. While this work deals primarily with North American genera and species, the keys include European forms in some cases where it is considered desirable to direct attention to differential characters. The work is illustrated by eight plates containing more than 270 line figures. Since practically all the European genera are figured, the work will prove a valuable aid to the identification of forms found on both sides of the Atlantic Ocean. The material which forms the basis of the study was collected and reared by the author and some of it a number of years ago. Parts IV and V, which conclude the series, it is mentioned, have been completed and will appear as another memoir within a short time. When completed, the work will form an admirable and up-to-date guide to the study of the many forms of Diptera found in aquatic habitats.

Crustacea of the Philippines

A CHECK list of Philippine Island decapods is given by P. Estampador Eulogio (*Philippine J. Sci.*, **62**, No. 4; 1937), but there are many additions to the fauna recently described from Woltereck's Wallacea Expedition to the Philippine and adjacent islands. The contributions already published are summarized by Dr. Woltereck in Band 34, Heft 3/5 of the Internationale Revue der gesamten Hydrobiologie und Hydrographie, 1937. This number is devoted to the Wallacea Expedition, and includes original contributions, especially on the freshwater Crustacea, by H. Balss (Potamonid crabs), V. Brehm (Diaptomids), W. L. Tressler (Ostracods) and E. Woltereck (freshwater Caridea). The Potamonid crabs are common in this region, living much on land and having no free-swimming larvæ. Dr. Woltereck has two important and extensive papers, the first dealing with races and species of the genus *Caridina* present in the islands, the second with their systematics and geographical distribution. The latter includes a list of all known species and a comparison with other Atyidæ.

Researches on Copepods

DR. C. H. EDMONDSON has studied copepods in Hawaii, Fiji and Tahiti (Quantitative Studies of Copepods in Hawaii with Brief Surveys in Fiji and Tahiti; Occasional Papers of Bernice P. Bishop Museum, Honolulu, Hawaii, **13**, No. 12, 1937). The semi-enclosed bodies of water are shown to support a much larger number of copepods than do the open reefs and a large number of animals feed upon the copepods. The author describes the feeding habits of *Eleutheria*, or creeping medusa, abundant among *Ulva* and other seaweeds on the shores of Oahu. "These minute medusæ may be seen ingesting copepods as large as themselves, becoming greatly distorted in the process, and at the same time holding two or three other copepods within the grasp of their tentacles." It is found that shoal water copepods are more resistant to falling than to rising temperatures. A large proportion survive 5° C. for 17 hours, but all die in 16½ hours at 35° C. Dilute sea water in the proportion of 1 part sea water to 3 parts fresh water has no detrimental effect on copepods during a period of 48 hours. Many copepods survive a reduction in *p*H from 8·6 to 5·8 for 24 hours, a few for 48 hours, none for 72 hours. Adult specimens are more sensitive than larval forms to altered ecological conditions.

Lichens from Greenland

THE lichens collected by Prof. Theodor M. Fries (largely crustaceous) in 1871, supplemented by the collections of Dr. Johannes Grøntved (mainly macro-Lichenes) and others have been examined and collected into one volume by B. Lynge of Oslo. This volume must represent a very comprehensive survey of present-day knowledge of Greenland lichens, especially of the region of and around the Island of Disko. This region was visited primarily by the 1871 expedition to bring to Sweden some blocks of iron, detected the previous year by A. E. Nordenskiöld; these were formerly thought to be of meteoric origin, but were later proved to be telluric. (Meddelelser om Grønland. Bd. 118. No. 8. 1937.) The collections of Fries, gathered under the forced conditions of an Arctic expedition, were found to be in remarkably good preservation, though some difficulties were experienced with regard to dates and exact localities. Many of the lichens were difficult to photograph, and a method, new to lichenology, was used to throw the surface details into sharper relief. The lichen is suffused with the vapours of a white and very fine-grained ammonium salt. Temporarily the colour contrasts of disk and thallus are masked, but afterwards the covering salt evaporates and no damage is done to the plant. Use was also made of Prof. Asahina's new reagent paraphenylenediamin, which in many genera was found to be of great value for specific distinctions.

Peculiar Cystoliths in the Cucurbitaceæ

DR. H. L. CHAKRAVARTY'S paper upon the physiological anatomy of the leaves of Cucurbitaceæ (*Philippine J. Sci.*, **63**, No. 4, August 1937) seems to require a revision of the accepted ideas of those peculiar aggregates of calcium carbonate known usually as cystoliths. In the genus *Momordica*, and particularly in *M. cochinchinensis*, such irregular deposits of calcium carbonate are very common in enormously enlarged epidermal cells. In *M. charantia* the cellulose peg upon which the deposits are formed is very short, but in *M. cochinchinensis* the cystoliths have no definite structure. They are very irregularly branched, and the calcium carbonate strongly impregnates a stratified, branched cellulose skeleton. Their frequency is remarkable—in a square centimetre of leaf 1,000–1,600; in an entire leaf there may be as many as 100,000; so that enormous quantities of calcium carbonate must be accumulated in a single plant. The author directs attention to the fact that Zimmerman has described a similar type of cystolith in *M. rostrata* Zimmerman.

Endophytic Fungi of Rye-Grass

A FUNGUS which has hitherto defied identification is commonly distributed freely throughout most tissues of rye-grass, *Lolium perenne*. It has sometimes been regarded as a stage in the life-history of *Epichlœ typhina*, but Miss Kathleen Sampson shows, in a recent paper (*Trans. Brit. Mycol. Soc.*, **21**, Pts. 1 and 2, 84, Oct. 1937), that it has few characters in common with this fungus. The endophyte has been isolated upon egg medium, and cultured afterwards upon agar media, but no further clue to its identity has thereby been revealed. A second fungus has been isolated, which grows readily upon many kinds of media, and which is no less systemic than the first. It produces spiral hyphæ and microconidia, but provides no reliable diagnostic features.

Crustal Deformations around Lake Biwa

LAKE BIWA is the largest lake in Japan, its length from north to south being thirty-seven miles, and its average width nine miles. Along its shoreline are distributed no fewer than thirty-six water-gauges, and, from their records, Prof. C. Tsuboi (*Earthq. Res. Inst. Bull.*, **15**, 935–942; 1937) has calculated the mean annual height of the surface at each station from 1887 until 1929. While there are many fluctuations in level, due probably to variations of rainfall, the mean annual height at all the stations shows that the level is falling at the rate of 5 ft. per century, and it is interesting to note that well-developed terraces occur at a height of about 650 ft. above the present surface. At one of the stations at the south end of the lake, the curve of mean annual height indicates a fall in level of about 6 in. during the years mentioned; while at another at the north end there was a rise of about the same amount. This suggests that the crust around the lake has been tilted towards the north by about 0·7 second of arc, and repeated series of levels along both sides of the lake agree nearly with this estimate.

Effects of Intensive Drying

SINCE H. B. Baker from 1912 reported rises in boiling point, surface tension and freezing point in the case of liquids intensively dried by phosphorus pentoxide, the problem has been investigated by others, who have mostly either failed to observe any change in physical properties or have explained the effects as due to superheating. D. A. Lacoss and A. W. C. Menzies (*J. Amer. Chem. Soc.*, **59**, 2676; 1937) now find that when purified benzene is desiccated with purified phosphorus pentoxide with precautions to exclude or destroy dust, its vapour pressure, near 80°, is lowered markedly if the drying process is carried on at room temperature, but raised slightly if the drying is carried on at 90° or 105°. Without opening the sealed apparatus, the vapour pressure could be caused to revert to the normal value by heating the liquid out of contact with the phosphorus pentoxide, provided the desiccation had not been too vigorous. On allowing access of normal air, vapour pressures likewise reverted to the normal value. No change in vapour pressure was found in the case of benzene if the materials used were not both purified and also dust-free, nor when barium oxide or magnesium perchlorate were used as desiccants. Carbon tetrachloride, normal heptane and cyclohexane failed to show any change of vapour pressure upon desiccation under the same conditions as had given positive results with benzene.

Raman Effect and Analysis

AN interesting review of the application of the Raman effect to the analysis of organic mixtures by J. Goubeau appears in a recent issue of *Angewandte Chemie* (**51**, 11; 1938). The author points out the suitability of the method for the analysis of substances with non-polar linkages, and most organic substances fall into this class. The spectrum being determined by the actual structure of the molecule is capable of distinguishing between all types of structural isomerides. Optical isomerides and their racemates give the same spectrum. The application of the Raman spectrum to qualitative analysis is discussed, and the sensitivity of the method is considered. The applications of the method to typical analytical problems are then mentioned. The process has been used to detect impurities in substances, for example, the presence of secondary butyl alcohol in fermentation propyl alcohol, methyl bromide in ethyl bromide, and methyl alcohol in ethyl alcohol. The identification of substances by this method has the advantage over the determination of melting point or boiling point that the substance is not affected by the process. The existence of characteristic lines for different groups of atoms (C : C, C ⋮ C, C : O, etc.) makes it possible to classify a substance. The use of the method when dealing with mixtures of substances difficult to identify in other ways is described, the work of Dupont on the terpenes being mentioned. *Cis-* and *trans-*isoeugenol have been detected in the presence of each other. Mixtures of hydrocarbons have also been investigated. Quantitative analysis is also possible by determining the intensities of characteristic lines of the substance.

Reduction of Occultations for Faint Stars

In a recently published paper (*J. Brit. Astro. Assoc.*, **48**, 3, January 1938) by Dr. M. Davidson an entirely new method is developed for the reduction of occultations. Instead of using the ordinary Besselian geometry, Dr. Davidson employs rectangular equatorial co-ordinates and shows how very accurate results are attainable. The method is applicable to stars of all magnitudes, but as the Nautical Almanac Office has computed certain constants for occultation stars brighter than magnitude 7·5, it is not suggested that the method should be used for these. The author hints at the possibility of taking into consideration the inequalities of the limb of the moon, thus greatly enhancing the value of a single occultation, and shows how this might be done, but admits the great difficulties in the practical application.

Interpretation of ε Aurigæ

THE paper on ε Aurigæ by Kuiper, Struve, and Strömgren, referred to in NATURE of January 22, p. 154, is now published (*Astrophys. J.*, **86**, 570), giving full details of the latest theory regarding this most interesting binary star. The following is a short summary of the system as postulated by the authors: The principal component, the so-called 'infra-red star' (*I* star), has a temperature of only 1,200°–1,400° and contributes no appreciable light in the spectral region covered by the observations. It has a very great diameter (about one third of the major diameter of the orbit) so that the outer layers of its atmosphere are as near to the second component as to the centre of the *I* star itself, and are subject to greater influence from this source. This second component, an *F2* star of much smaller diameter, is the source of the observed spectrum as well as of the visible light from the system, and by photoelectric action of its ultra-violet radiation produces a shell of highly ionized material in the outermost layers of the *I* star. This shell is semi-transparent, and during the eclipse of the *F2* star (which is of 'grazing' character, not central) absorbs about half the light of the latter in a non-selective manner, thus explaining the observed constant minimum of the light curve and the similarity of the spectrum throughout. In the words of one of the authors, we are presented with "a new astronomical phenomenon, an eclipse by a stellar Heaviside layer".