RESEARCH ITEMS

Pleistocene and Prehistory in Europe and China

EXTENSIVE research by Wen-Chung Pei in the Chinese Pleistocene and comparison with corresponding results of European geologists and archæologists is summarized in "An Attempted Correlation of Quaternary Geology, Palæontology and Prehistory in Europe and China" (Institute of Archæology, University of London. Occasional Paper No. 2, 1939. Pp. 16+2 tables. 2*s*. 6*d*.). The object of the investigation was to arrive at the age of Sinanthropus, which is here assigned to the Lower Pleistocene in spite of the lithic industry, which exhibits a few features that in Europe do not appear until later. From the point of view of human evolution Sinanthropus would be contemporary with the European Eoanthropus and *Homo Heidelbergensis*. While the European Quaternary covers four main periods of cold climate, in China four physiographic cycles may be observed in which phases of erosion alternated with phases of sedimentation. From the geological point of view, Europe and China have two series of Pleistocene deposits in common, the older covering the period from late Pliocene to early Pleistocene, the younger characterized by the frequent occurrence of loessic material. These two series can be correlated in Europe and in China stratigraphically, lithologically and faunistically; but it is impossible to go further and into detail. It is premature, therefore, to base a correlation on geological evidence only. A purely palæontological basis, notwithstanding difficulties, is more satisfactory. The early Saumenian corresponds to Villafranchian, Choukoutien (Sinanthropus level) to Cromerian, Choukoutien III to early middle Pleistocene, Sjara-Osso-gol (Ordos) to Neanderthal, and Choukoutien Upper Cave to European Upper Palæolithic. Prehistory helps little, owing to differences of workmanship, but subject to this proviso, Choukoutien loc. 13 is contemporary with Abbevillian, Choukoutien loc. 15 with early Acheulean, early Clactonian and Tayacian, Ordos with middle and late Acheulean, Micoque, early and middle Levalloisian and Mousterian, and Choukoutien Upper Cave with upper Palæolithic—Aurignacian, Solutrean and Magdalenian.

Insulin Hypoglycæmia and the Central Nervous System

ERNST GELLHORN reported his investigations on the effects on the central nervous system of insulin hypoglycæmia before the recent meeting of the American Association. There is a close interrelationship between its effects and those of cerebral anoxia, in that the two states are mutually synergistic, and in both there is depressed cortical but augmented autonomic excitability. The resultant increased activity of the sympathetic system tends to restore the blood-sugar level, and at the same time to render the medullary centres less excitable, in this case by a direct action upon them of circulating adrenalin. Such reactions tend to restore the animal to its resting state, but may, under slightly different conditions, aggravate the effects of the changes. Thus, prolonged anoxia may prevent hypoglycæmic convulsions, but may also prevent the eventual restoration of a normal blood-sugar level by depressing the mobilization of the hepatic stores of glycogen.

Inheritance of Bobbed Hair

S. E. STODDARD (*J. Hered.*, **130**, 543–545; 1940) reports a pedigree in man showing the inheritance as an autosomal dominant of a short fore-lock. The hairs of the fore-lock on the head of the affected individuals grow to five or six inches and then fall out, being replaced by new hairs which again reach 5½ inches and then fall out. This self-bobbing characteristic is to be called 'catatrichy'.

The Oldest Vertebrate Egg

FOSSIL reptilian eggs have been recorded from Cretaceous and Jurassic deposits, but they are rare, and the most striking discovery hitherto was the nest of dinosaur eggs found in the Desert of Gobi by Dr. Roy Chapman Andrews and his fellow-explorers. All earlier records are, however, much antedated by the discovery of an egg, 59 mm. long, at Rattlesnake Canyon, Archer Co., Texas, in rocks which lie close to the boundary between Carboniferous and Permian. Prof. Alfred S. Romer and Llewellyn I. Price describe the shell, almost 1 mm. thick, as ornamented with small rounded tubercles, and in section showing lamellæ, typical of amniote egg-shells (*Amer. J. Sci.*, **237**, 826; 1939). The interior, as examined by X-ray photographs, showed no indication of embryonic development. Although it is impossible to say to what reptile the egg must be assigned, the most abundant of the four common reptiles of the Red-beds of Texas is the pelycosaur Ophiacodon (Theropleura), and the "chances are perhaps somewhat in its favor as the possible progenitor".

Growth Hormones in Seed Dressings

H. E. Croxall and L. Ogilvie (*J. Pom. and Hort. Sci.*, **17**, 362; 1940) have shown that the application to pea and bean seeds of dry fungicidal dressings containing growth-promoting substances may be of considerable value. The vegetative growth of several different varieties of pea plants was stimulated by such treatments, but there was no difference in time of flowering. The dressings used consisted of talc, a proprietary mercurial dressing, and cuprous oxide, containing 5–20 parts per million of naphthalene acetic acid, mixed naphthylidene acetic acids and indolyl butyric acid. The rate of emergence of pea seeds sown in sterile soil in the greenhouse was accelerated, and the dry weight of the seedlings after three weeks growth was increased, by treating the seeds with the above dressings. In certain conditions, the development of some varieties of peas was checked by mercurial and cuprous oxide dressings. This check was partly or entirely overcome by the incorporation of growth substances. In field trials in summer, mercurial and cuprous oxide dressings alone reduced the crop when the soil was dry for a long period, but dressings containing growth substances gave yields up to 80 per cent greater than those from untreated seeds. In greenhouse soil contaminated with damping-off fungi, a higher percentage emergence from several varieties of peas, and one of dwarf beans, was obtained by treating the seeds with hormone-containing dressings than by the use of the same dressings without hormones. There was considerable difference in the response of different varieties to the dressings used.

Two Distinct Diaphorases

COENZYME-SPECIFIC dehydrogenases catalysing the oxidation of tissue metabolites such as lactic acid may require the presence of coenzyme I (diphosphopyridine nucleotide) or coenzyme II (triphosphopyridine nucleotide). Reduced coenzymes I and II do not by themselves react with oxygen, and a further link has been made by the demonstration of the presence in animal tissues of a 'coenzyme oxidase', named by Euler 'diaphorase' and by Dewan and Green 'coenzyme factor', which catalyses the oxidation of these reduced coenzymes I and II. Also, cytochromes -*a* and -*b* are rapidly reduced by the diaphorase – coenzyme system and re-oxidized by cytochrome oxidase and oxygen. The complete system for lactate is thus :

Lactate —→ Coenzyme —→ Cytochromes -*a* and -*b* —→ Oxygen
dehydrogenase diaphorase cytochrome oxidase

(arrows show the direction of hydrogen transfer). Straub, Corran and Green showed that diaphorase is identical with a flavoprotein isolated from heart muscle containing flavin-adenine-dinucleotide as prosthetic group. E. P. Abraham and E. Adler (*Biochem. J.*, **34**, 119 ; 1940) have now confirmed that there are two distinct diaphorases having activities with respect to coenzyme I and coenzyme II. Thus diaphorase from heart has only diaphorase I activity, and that from acetone-dried adrenal possesses also diaphorase II activity, and the ratio of the activities of diaphorase II and diaphorase I varies widely for different tissues.

Evaluation of *e*, *m* and *h*

AN important paper on the evaluation of the electronic charge and mass and the quantum of action was read by C. G. Darwin at a meeting of the Physical Society on February 9, and is appearing in the March issue of that Society's *Proceedings*. This subject has recently been discussed by Dunnington in *Reviews of Modern Physics* and by Du Mond in the *Physical Review*. The aim in each case is to derive the best possible values of *e*, *m* and *h* by combining all the different experimental data. By considering the logarithms of the quantities concerned rather than the quantities themselves, Darwin develops a method which is simpler than Dunnington's and might well be adopted in any future revision of the constants. Du Mond takes much the same point of view, but where his method is approximate, Darwin's is exact. Darwin agrees with the other two investigators in concluding that there is a discrepancy between the direct determination of h/e and the other experimental methods. There has probably been some unknown systematic error in the determinations of the limit of the X-ray continuous spectrum, unless, as is far less likely, there are systematic errors in several of the other experiments which happen to give concordant fallacious values. The final results are : $e = 4{\cdot}8025 \times 10^{-10}$, $e/mc = 1{\cdot}7591 \times 10^{7}$ and $h = 6{\cdot}6243 \times 10^{-27}$, the probable error being about one in ten thousand in each case. With these values the fine-structure constant $hc/2\pi e^2$ is 137·03, with probable error about 0·03.

The Study of Atmospherics

T. H. Laby, J. J. McNeill, F. G. Nicholls and A. F. B. Nickson (*Proc. Roy. Soc.*, A, **174**, 145) have carried out a series of investigations of atmospherics, using an aperiodic aerial connected through an amplifier to a self-recording cathode-ray oscillograph. The results confirm those of previous workers that the electric field changes due to a lightning discharge include a slow field change due to the leader stroke, a rapid return stroke, and a final slow non-oscillating change. The disturbance is often followed by waves reflected from the ionosphere. In some cases a damped oscillating discharge was observed, and reasons are given for regarding this as a feature of the discharge rather than a result of successive reflections. A mean value of the peak power in an atmospheric is 5×10^5 kw., and of the total energy radiated 200 kw. sec. This is small compared with the total energy of a thundercloud.

An Auto-collimating Spectrohelioscope

M. A. ELLISON has described very fully a home-made spectrohelioscope (*J. Brit. Astro. Assoc.*, **50**, **3** ; 1940). The instrument took Mr. Ellison 2½ years to construct. A clear explanation with numerous diagrams is provided, and those who are interested in the subject should study the paper carefully. It is satisfactory to know that the performance of the instrument has come up to expectations, and most of the chromospheric details in $H\alpha$ light visible in the Hale instruments are shown. The performance is particularly good with limb prominences.

Spectrum of Nova Aquilæ (1918)

A DETAILED examination of the spectrum of Nova Aquilæ has been made by Arthur B. Wyse (*Pub. Lick Observatory*, **14**, Pt. 3) and is a valuable contribution to data already published by a number of other workers on this interesting nova. Nova Aquilæ is the only nova of which the pre-nova stage spectrum is known. As a star of about mag. 10·5, its spectrum appears as approximately of Class *A* on the Harvard plates taken about thirty years before the outburst. With a rapid rise in brightness commencing on June 7, 1918, it reached a maximum brilliance of mag. – 1·1 by June 9·9. (It is the brightest nova since Nova Ophiuchi in 1604.) At the present time it is a star of about mag. 10·8. Another interesting feature of this nova was the subsequent appearance of an expanding luminous disk discovered by Barnard three and a half months after the outburst on June 7. Later measurements made by Aitken gave a rate of angular expansion of about 2″ a year. Combining with this value the measured Doppler shifts representing radial motion, a distance of about 360 parsecs or 1,200 light years is derived. The absolute luminosity of the nova at maximum was of the order 300,000 times that of the sun. The spectrograms which form the basis of the present work were taken at the Lick Observatory, but because of the rapid changes in spectrum during the active stages of the nova, spectrograms from a number of other observatories (Mt. Wilson, Cape of Good Hope, Cambridge, etc.) form a valuable link in the daily journal of the spectrum which Dr. Wyse has prepared. Reference must be made to the text for details of the changing absorption and emission spectra. There were three absorption spectra recognized in the order of appearance, I, II and III, on June 8, 10 and 11 respectively. This order also represents the relative magnitudes of the Doppler displacements of the spectral lines towards the violet. The chief points of interest in the emission spectrum include the oscillatory change in the profiles of the bands during the few weeks following the outburst, and also the peculiar distribution of light in the various emission bands in the spectrum of the expanding nebulous envelope.