

Research Items

Excavations at Tepe Gawra, Iraq

THE elimination of all but three archaeological expeditions to Iraq through the working of the Antiquities Law would add interest to almost any find in the season which has just passed; but the excavations which have been carried out by the joint expedition of the Museum of the University of Pennsylvania and the American School of Oriental Research at Tepe Gawra are in themselves of too great importance to need extraneous enhancement. Mr. Charles Bache, field director, in a report circulated by Science Service, Washington, D.C., states that he has now reached the level of the twelfth city (counting from above) on the site. This he dates at about 4000 B.C. Exploratory trenches have revealed the existence of eight earlier levels. In the recently discovered twelfth city, which appears to have been destroyed by fire, no trace of metal was found, and it is concluded that the inhabitants were still in the neolithic stage. Its architecture is superior to that of the three cities immediately following. The pottery here, as well as in the eight succeeding, later levels, is of the 'painted' type. In a large building which has just been uncovered, the largest of the many rooms measures 37 ft. × 17 ft., a remarkable feature being that its mud-brick walls are coated with a fine white plaster. This is the earliest use of white plaster that has been discovered hitherto, and indicates knowledge of the process of burning lime. The fact that the walls of the room appear to be oriented to the cardinal points suggests a knowledge of astronomy. While no flat seals have been found, two impressions indicate their use.

Sex and Cultural Status

DR. J. D. UNWIN, in an address delivered to the Medical Section of the British Psychological Society in March last ("Sexual Regulations and Cultural Behaviour". Oxford University Press. Pp. 63. 2s. 6d. net), restates the argument for his view that opportunity for the satisfaction of the sexual impulse is related to the type or grade of culture of a society. Societies are classified according to their behaviour in relation to their objects of worship: 'deistic', when temples are erected to a god; 'manistic', when there are no temples, but acts of worship are performed at the graves of the powerful dead; and 'zooistic' when in times of difficulty offerings are placed before a "strange power". Each of these types of society has a characteristic form of sexual opportunity. Societies permitting pre-nuptial freedom are zooistic; those inflicting an occasional continence are manistic; while those insisting on a complete pre-nuptial continence are deistic. An analysis of social conditions on these lines indicates that there is a relation between sexual energy and social energy, the latter being a manifestation of certain inherent powers which remain potential except under conditions of continence. They are then released and the society becomes 'expansive'. In the past, sexual opportunity has been reduced to a minimum only with the introduction of absolute monogamy; and in human records there is no case of an absolutely monogamous society which has failed to display great

energy. On the other hand, if the condition of absolute monogamy is relaxed, as usually has happened, the society loses its energy and power of expansion and passes from one grade to another, as happened in the Christian church, when, the regulations of continence being relaxed, it ceased to be purely deistic, and passed to the manistic stage with the introduction of the medieval cult of the saint.

Application of Vocational Guidance Methods

REPORT No. 6 of the National Institute of Industrial Psychology presents the results and methods of "A Vocational Guidance Research in Fife" carried out by F. M. Earle and J. Kilgour. The inquiry was designed to give comparisons between children in different stages of growth, by testing the same children at intervals with the same tests; to differentiate between children of urban and rural areas; to study the question of the best age at which vocational guidance studies should be begun; and to determine minimum standards of qualities of abilities and temperament desirable for various occupations. The investigation showed the town children to be superior in verbal ability, and the country children to be superior in non-verbal processes and practical activities. Interesting results concerning the consistency of test-scores from year to year are presented. Those of general intelligence show the highest consistency, but the tests of English and arithmetic gave comparable scores after a one-year interval, but not longer. In the case of mechanical ability the results suggested that it was of relatively late development, and could be measured more accurately between the ages of twelve and fourteen years than between ten and twelve years. Measures of mechanical ability were applicable at all ages, but reliable for short periods only. In view of these conclusions, the report recommends that there should be two stages in the application of vocational guidance methods; at the first the child should be tested before the age of twelve years with regard to recommendations for specialisation in later school work, and at the second stage, between the ages of twelve and fourteen years, he should be tested with regard to vocational recommendations.

Results of the Vernay-Lang Kalahari Expedition

THE freshwater fishes and the reptilia and amphibia are reported on by Henry W. Fowler and V. Fitzsimons respectively in vol. 16, pt. 2, of the *Annals of the Transvaal Museum* (Scientific Results of the Vernay-Lang Kalahari Expedition, March to September, 1930), February 1935. The fishes are very interesting, most of them showing a large range of variation, especially in colour. 900 specimens were secured, representing thirty species, of which twelve are new. The fishes from the Tsotsoroga Pan and from the Nata River are probably the first ever collected in these localities, those from the first having come originally from the Okovango inundations, the Nata River rising independently in Southern Rhodesia and running directly into Makarikari Lake, which is strongly brackish. Some of the fishes survive even in the larger brackish pools. The reptilia and

amphibia are not confined to the Kalahari, but include specimens from Bechuanaland Protectorate, Transvaal and Southern Rhodesia. They form a large collection of 1,452 specimens, belonging to 23 families and sub-families, 60 genera and 99 species and sub-species: tortoises and turtles, one crocodile, lizards, chameleons, snakes, frogs and toads. 18 new species and sub-species are fully described, preliminary diagnoses having been published already by the author. These include a *Kiniscys* and a *Pelusus*, a *Typhlops*, a *Chlorophis*, a *Psammophis* and a *Xenocalamus*, with several Lacertilia and Amphibia. Valuable field data are given, including breeding notes in many cases.

Life-History of a Nematode in Mice

B. SCHWARTZ and J. E. Alicata (*J. Wash. Acad. Sci.*, 25; 1935) describe the life-history of *Longistriata musculi*, a nematode parasitic in mice. The eggs hatch in about twenty-four hours after passing from the host, and the larvæ undergo one moult and are then infective to mice; these larvæ correspond in morphology and behaviour to third-stage larvæ of trichostrongyles in general. White mice were infected by the larvæ by way of the mouth and through the skin, and each portal of entry resulted in the worms reaching the small intestine, where they underwent their entire development, including two moults. The route from the skin to the intestine has not been ascertained; passage through the lungs was exceptional. In three white mice infected through the skin, egg-production by the worms was limited to about two weeks. Infection of two mice by way of the mouth resulted in a much greater output of eggs by the worms, which persisted as long as the mice survived, 32 and 63 days respectively, after the infection. It is suggested that the striking difference in egg-production by the worms in these two groups is probably due to a marked stimulation of the defence mechanism of the host coincident with the migration of the larvæ following infection through the skin. This stimulation is either lacking or not marked when the larvæ enter by way of the mouth.

Structure of *Drosophila*

THE fly *Drosophila melanogaster* has become one of the most widely used laboratory animals for genetical and other studies. The general structure of the creature, as distinct from the group of Diptera to which it belongs, has attracted comparatively little attention. This gap in the knowledge of *Drosophila* has been met to some extent by a recent publication by Mr. Eduard H. Strasburger. In a 60-page brochure, entitled "*Drosophila melanogaster*, Meig. Eine Einführung in den Bau und der Entwicklung" (Berlin: Julius Springer, 1935. 6.90 gold marks), he describes the general external and internal anatomy of the insect in its larval, pupal and adult phases, together with an account of metamorphosis and a very brief statement on the embryology. The work is illustrated by 71 text-figures and is accompanied by a short bibliography. It should prove useful as an introduction to its subject, especially to workers who are not specialists in entomology.

Sooty Mould Fungi

MISS LILIAN FRASER has made a study of the fungi causing sooty moulds (*Proc. Linn. Soc. New South Wales*, 58, Parts 5-6, 1933; 59, Parts 3 and 4, 1934). Sooty moulds are caused by several fungi, which

together produce a dark brown or black felt of mycelium upon the leaves and branches of certain plants following attack by aphids. Miss Fraser's first paper shows that the fungi all belong to three groups—the Capnodiaceæ, Atichiaceæ, and Fungi Imperfecti. After a review of the species of sooty mould occurring in New South Wales, it became obvious that two main types appeared—annual and perennial. The former were constituted largely from mixtures of *Dematium*, *Cladosporium*, *Alternaria*, *Asbolisia* and *Tripasporium*, whilst perennial moulds incorporated members of the Capnodiaceæ, *Atichia*, and a species from the Fungi Imperfecti. The second paper records a large number of results from cultural experiments with all types of sooty mould fungi. They are all shown to require different optimum concentrations of specific carbohydrates and nitrogen, and this fact may explain their distribution on plants attacked by woolly aphis or greenfly. 'Honey-dew' secreted by these insects consists of dextrin and other specific complex carbohydrates, along with protein material.

Chinese Loess Deposits

Observations by Prof. G. B. Barbour on the loess of North China (*Geograph. J.*, July 1935) clear up some points in regard to the nature and origin of the Chinese loess. The term loess has been employed to embrace three types of surface deposit. Loess accumulated during the Malan (Upper Pleistocene) stage of aggradation, which is generally unbedded, over much of the North China highlands rests on an older deposit having certain distinctive features. This deposit is more clayey and has a crude layer structure. The thick layers are more loessic in character, darker in colour and very like the upper Malan loess. It would appear that these layers represent a succession of soil horizons from which the soluble material was leached, and the arrangement suggests that deposition was interrupted by long intervals during which the surface was exposed to weathering. This series of deposits Prof. Barbour terms banded loessic loams. Still older is a series of red clays referred to the Pontian stage of the early Pliocene. These are associated with a less rugged topography than that of to-day. Chemical and mechanical analyses of the material showed that the aeolian process was dominant in the deposition of the Malan loess and the banded loams. Prof. Barbour goes on to try to correlate these deposits with climatic changes. The general conclusions point to warm semi-arid conditions in the lower Pliocene, with increase of rainfall in the middle of the period and cooler and drier conditions at its close. At the end of the lower Pleistocene, a milder and damper climate (Choukoutien stage) was followed by the cold semi-arid Malan stage, which gave way to present conditions at the close of the Pleistocene.

Weather Cycles and Droughts

IN a paper read before the American Meteorological Society in June, Mr. Halbert P. Gillette attributes the recent severe drought in the United States to the coincidence of the minima of several long cycles of rainfall. The most marked of these is about 152 years in length, with an amplitude of 25 per cent; he finds this cycle not only in New England rainfall but also in the Nile floods, the tree rings of pine and *Sequoia* in Arizona and California, and the annual 'varves' or clay laminae deposited during the

retreat of the last ice sheet in Canada. He considers that this cycle also determined the succession of halts and rapid retreats of the ice sheet in Finland. Judging by the evidence presented, the cycle of 152 years is probably real, and is important in geophysical phenomena; but the method of periodogram analysis adopted is not mathematically rigid, and the shorter cycles tabulated rarely agree with those found in meteorological data by more exact methods. A novel point is that each cycle is supposed to go through a 'cycle of amplitude' of many times its own length, that of the 152 year cycle being estimated as 1,825 years, but for the shorter cycles at least this apparently represents merely the 'beat' with the annual cycle.

A Recording Manometer

PAPER No. 91 published by the Safety in Mines Research Board is entitled "A Recording Manometer having Low Inertia", by G. Allsop and H. Lloyd. The principle of this manometer is the use of a thermionic valve connected to an oscillograph, which records the displacement of a small diaphragm exposed to transient pressures such as are produced by explosions. Various improvements on the original type are described, and it is shown that this manometer, with small variations, can also be used as a dynamometer. The appliance appears to be quite satisfactory, but is tolerably expensive, and is not likely to replace ordinary manometers for everyday work in mines, in which explosion pressures do not have to be measured. For measuring such transient pressures, especially where the cost of an appliance does not enter into the question, this ingenious manometer appears to be quite satisfactory.

Kiln-drying of Wood with Ozonised Air

THIS problem has recently been discussed by S. N. Kapur (*Indian For. Rec.*, 20, Pt. 13. Delhi: Manager of Publications, 1935). The method consists in drying wood in an atmosphere containing small quantities of ozone, and is based on the assumption that the constituents of the wood during the long periods required for air-seasoning are subject to slow oxidative changes, which transform the sap contents chiefly—and according to some authorities the wood substance as well—into more stable compounds, thereby making the wood less liable to shrink and swell with changes in the humidity of the surrounding atmosphere, and consequently, more suitable for high-quality work. In summing up the results of his investigations, the author says that woods containing oils and oleo-resins, which are difficult to 'kiln-dry', are in no way benefited by the addition of ozone to the circulating air in the kiln; that the addition of ozone to the air in the kiln does not accelerate the rate of drying of either resinous or non-resinous woods; and that timbers dried in an atmosphere of ozone, that is, 'artificially aged', do not show any greater stability towards changes of atmospheric humidity than those dried in a kiln without the addition of ozone.

Structure of Platinum Compounds

THE structure proposed for platinum compounds of the 4-covalent type $[Pt a_2 b_2]$ by Werner was that the valencies have a planar arrangement. A test of this, and a differentiation between a planar and a tetrahedral arrangement of valencies, is provided by substitution derivatives of bisethylenediaminoplatinous salts, $[en_2 Pt] X_2$. Diphenyldimethyl

derivatives have been prepared by W. H. Mills and T. H. H. Quibell (*J. Chem. Soc.*, 839; 1935), and the optical activity of the compounds leaves little doubt that the planar configuration proposed by Werner is the correct one. The salts investigated proved capable of resolution into antimeric optically active forms showing a high degree of optical stability. The regular tetrahedral arrangement of valencies is excluded, and there are no reasons for inferring a pyramidal rather than the more symmetrical planar configuration. The planar arrangement of the platinum valencies with the intervalency angle of 90° is also shown to give rise to a practically strainless ring, whilst an arrangement with a tetrahedral valency angle would give rise to a very considerable strain in a 5-atom ring composed of carbon and nitrogen atoms and one 4-covalent platinum atom.

Einstein's Gravitational Equations

WE have received a very brief letter on this subject, dated June 2, from Prof. J. Ghosh; to make it intelligible to a wider range of readers it seems advisable to incorporate it with some references to Einstein's own work. The gravitational equations originally proposed, namely,

$$R_{im} - \frac{1}{2}g_{im}R = -8\pi T_{im},$$

represented a law of conservation such as that of momentum or mass and energy. Moreover, the left-hand side of the equation arose naturally in at least two mathematical processes. In spite of this, Einstein later (*Math. Ann.*, 97, 99; 1927) gave electromagnetic and cosmological reasons for suggesting that the coefficient $\frac{1}{2}$ should be replaced by $\frac{1}{4}$. Prof. Ghosh (*Z. Phys.*, 85, 511; 1933; and 94, 411; 1935) has investigated the solutions of the new equation in four cases, corresponding to empty space, a single particle, an electron, and a rather more general system with radial symmetry. The results all contain a term belonging to de Sitter's world. Thus the new field equations automatically involve the cosmological constant, which is usually introduced as a special hypothesis. It is desirable that Prof. Ghosh's work should be extended to a more general distribution of masses, but this appears to be difficult.

Changes in the Spectrum of γ Cassiopeæ

THE spectrum of γ Cassiopeæ contains hydrogen lines each made up of double emission lines superimposed on a broad absorption line. Unlike many such stars, the spectrum had been considered to be always the same until recent observations by Dr. W. J. S. Lockyer showed that the two components of each of the double emission lines went through regular changes of relative intensity. This brought the star into line with other bright hydrogen line stars, most of which show similar changes. Later observations described by Dr. Lockyer (*Mon. Not. R.A.S.*, 95, 520), however, show a most unusual type of change in these lines. The red component of each double had faded right out in March 1934, after which the remaining single emission lines (at that time forming the violet components) moved across to the position of red components, and in November new faint violet components appeared, the lines being again double, but with strong red and faint violet components. Such a change is believed to be unique in the history of such stars, and is difficult to explain by any of the current hypotheses.