Research Items

Petroglyphs of North Central New Mexico

IN the eleventh report of the Archæological Survey Series of the University of Denver, Colorado ("Petroglyphs of North Central New Mexico", Anthropological Department, University of Denver. Pp. 58 with plates), Prof. E. B. Renaud gives the results of exploratory investigation of the rock carvings, engravings and paintings to be found in the region centring on Santa Fé, which was initiated in 1932, carried on in succeeding seasons, and finally reviewed in an expedition of 1938. The region to the north and south of Santa Fé, here under survey, is divided into three areas, north, west and south-eastern, mainly on geographical grounds. The petroglyphs found in these divisions do not differ materially in character. The whole region is bisected from north-east to south-west by the great Rio Grande valley. Certain general conclusions are drawn from the detailed descriptions of the sites. All sites, with a single exception, have anthropomorphic representations, whether realistic or schematic, isolated or in groups. Among occupations noted are dancers, flute-players, hunters, and warriors. Several dancers wear headdresses—horns or feathers. There were a few instances of men on horseback. The presence of phallic figures, frequently ithyphallic, is unusually marked. Simple or stylized human figures are present on all sites. Hands are seen at fairly numerous sites, though never many together. Zoomorphic figures are abundant, though not to be identified with certainty, excepting deer. Eight sites display birds, one type being the spread-eagle or 'thunder-bird'. The serpent is omnipresent. Phyllomorphs are rare, and skeuomorphs not numerous. There is a vast class of geometric figures, signs, and symbols. Though no chronology is attempted, the majority of the figures belong to the prehistoric period of the south-west, which in Mexico ends about A.D. 1540, when the horse first became known to the Indians.

Iron Age Settlement in Wiltshire

THE excavations of the smaller of two prehistoric sites at Woodbury, near Salisbury, Wiltshire, now being carried on by Dr. Gerhard Bersu on behalf of the Prehistoric Society in pursuance of its recently instituted policy of systematic research in the field, have thrown considerable light on social conditions in the Early Iron Age in Britain. The report on the first season's excavation (*Proc. Prehist. Soc.*, N.S., **4**; 1939) states that in the period from June 12 to September 18 about one fifth of the total area of the settlement of about 15,000 sq. metres, was uncovered down to the chalk. The settlement belongs exclusively to Early Iron Age *A*, and was of long duration. A ditch planned during the existence of the settlement was never completed; but it is evident from analogous sites in the area that some threat, at present of unknown character, forced the inhabitants to defend their open settlements by banks and ditches. This was at a time when hill-forts also were being planned. At one period, a simple palisade surrounded the site; but whether before or later than the construction of the ditch awaits elucidation. The main features of the site are the provision by pits and over-ground structures for the storage of grain after partial roasting, hollows in which it is suggested the harvested grain was prepared for roasting and storage, and two circular structures for habitation—the first of their kind to be found in Early Iron Age *A* in Britain—of which the larger with the longer structural history, and situated in the middle of the enclosure, is clearly the principal building and the residence of the proprietor of the settlement. This settlement was neither a cattle kraal, as had been suggested, nor a village, but a farm in the nature of the subsequent Roman villa.

Revival After Electric Shock

W. T. MCNIFF has reported (*J. Elec. Workers and Operators*, **36**, 145; 1937) that he is able to revive small animals, which have been apparently killed by electric shock, by the application of a 'counter-shock' of 60 cycle A.C. As Wiggers has shown, the heart in fibrillation can be made to beat normally by the passage of an electric current through it, and this, apparently, is the mode of action of the 'counter-shock'. If the lethal shock is applied through electrodes on the head and tail, revival is not possible, since the central nervous system is destroyed. It follows, therefore, that this method cannot be employed to revive those subjected to legal electrocution. For the method to be effective, the lethal shock must not pass through the head, and the counter-shock must be applied through electrodes on chest and back within four minutes of the patient having received the apparently lethal shock.

Action of Quinine on Skeletal Muscle

A. M. HARVEY (*J. Physiol.*, **95**, 45; 1939) has studied the actions of quinine on skeletal muscle, on the motor end-plate, and on the responses of the muscle to various other drugs in frogs, domestic fowls and cats with the following results. Quinine caused an increase in the tension response to a single maximal stimulus in normal, curarized and denervated muscle. This mechanical potentiation was accompanied by an increase in the amplitude and duration of the muscle action potential. The ability of the muscle to respond to a tetanus was diminished owing to an increase in the refractory period of the muscle fibres. The excitability at the motor end-plate was lowered by quinine, and the ability of a tetanus to facilitate conduction at the end-plate was weakened or abolished. Eserine and veratrine were no longer able to evoke repetitive response to a single stimulus in a muscle treated with quinine. The response of the normal mammalian muscle to injected acetylcholine was abolished by quinine. This phenomenon was largely due to the curariform action of the drug, the otherwise similar response to injection of a potassium salt being little affected.

Optical Isomerism and Growth

J. R. Totter and C. P. Berg (*J. Biol. Chem.*, **127**, 375; 1939) have prepared the optical isomers of natural tryptophane, histidine and lysine, and given them to mice in diets deficient only in the corresponding natural form and under conditions analogous to

those previously employed in similar studies on rats. The growth promoted by the unnatural isomers of tryptophane and histidine was found to be slower than that induced by the modifications which occurred naturally in proteins. The response was quantitatively but not qualitatively at variance with that observed in rats. Unnatural lysine in the mouse as in the rat failed to promote growth when added to diet deficient in natural lysine.

Mammals of Tennessee

A USEFUL account of the mammals of this State has been based upon the special survey made by the U.S. National Museum in 1937, supplemented by all the relevant material in the collections of the Museum and of the Biological Survey (Remington Kellogg, *Proc. U.S. Nat. Mus.*, **86**, 245; 1939). The author does not draw any conclusions from his list, but it is apparent that this is a fair sample of the mammals of the eastern States, its notable feature being perhaps the degree to which man has changed the aspect of the original fauna by his interference. The tale is largely one of reduced numbers and extermination. There is scarcely a creature, valued even in small degree for its pelt, which is not reported to be decreasing; even the opossum and raccoon are fewer, mink and skunk are becoming rare, fisher and otter and perhaps beaver are extinct. So with the larger beasts of prey, the grey wolf, black bear and others having been exterminated in many sections. Bison and elk disappeared in the early years of the nineteenth century; even the Virginian deer seems to be on its last legs, though in 1789 where troops were stationed good venison was accepted in lieu of taxes at a value of 9*d*. a pound. On the other hand, there have been additions to the fauna: fifteen wild swine from northern Germany were enclosed in 1912 and multiplied; about 100 broke through the fence in 1920 and now their progeny ranges over an area of 50 square miles. Coyotes have also been introduced recently, "for the purpose of training hounds" it is said; and of course those invariable camp followers of civilization, the house-mouse, black rat, Alexandrine rat and brown rat have long been successfully established.

Distribution of Crop Productivity

IT has been found that an area which produces high yields of one crop, for example, wheat, will as a rule also produce yields above the average of other crops, for example, barley, hay or potatoes. A statistical analysis of the geographical distribution of crop productivity in England (*J. Roy. Statistical Soc.*, **102**, 21; 1939) has been made by M. G. Kendall, head of the Statistical Branch of the Ministry of Agriculture. The economic importance of the results is obvious, but from a wider point of view perhaps the most interesting aspect of the analysis is the application to agricultural economics of methods devised for psychological tests of intelligence. The prevalence of positive correlations between yields of different crops is a phenomenon similar to the prevalence of positive correlations of the results of mental tests. It is natural to ask if there is a coefficient of general productivity analogous to Spearman's *g*, the much-disputed general factor in intelligence. Mr. Kendall offers no fewer than four such coefficients. The first two, the 'productivity' and 'ranking' coefficients, are based on psychological methods. These two coefficients give nearly the same results; the first is preferable theoretically, but the second is much easier to calculate. The third and fourth, the 'money-value' and 'energy' indexes, are spatial index numbers, agreeing fairly well with each other, but not so well with the previous pair. Finally, an attempt is made to estimate the validity of the conclusions reached by psychologists by seeing how far the same arguments hold when applied to crop productivity.

Potato Metabolism and the Blight Fungus

AN interesting paper upon the rates of growth of potato foliage and tubers in relation to attack by the blight fungus, *Phytophthora infestans*, by the late P. A. Murphy, has recently been published (*Sci. Proc. Roy. Dub. Soc.*, **22**, N.S. No. 7, 69–82, February 1939). It has proved relatively easy to eliminate blight, but more difficult to avoid injury to the foliage. The first effect of spraying is usually to check the production of foliage and tubers, and benefits of the fungicidal wash only become apparent later, when the parasite is eradicated. Complete control of the disease without appreciable injury to the plant was effected by weekly applications of dilute solutions of cuprous oxide, with about half the quantity of copper usually given per acre with Burgundy mixture. Maximum production of tubers reached 1½ tons per week during the month of July, after which it fell off, until in September it was not much above ½ a ton per week. The period of maximum tuber production corresponded with that of maximum foliage. Benefits of spraying depend upon the interval between the arrest of production caused by the blight fungus, and the time of normal cessation of growth in September.

Sexual Isolation

ALTHOUGH it has been known for some considerable time that preference in mating was a powerful means of isolating one species or race from another there has been little experimental evidence available. T. Dobzhansky and P. C. Koller (*Biol. Zentralb.*, **58**, 589; 1938) have analysed preferential mating between *Drosophila miranda* and *D. pseudo-obscura* and between *D. azteca* and *D. athabasca*. It was found that in mixed cultures of these species homogametic mating was greatly preferred. Degrees of preference were, however, exhibited when different races of *D. pseudo-obscura* and *D. miranda* were used. Within *D. miranda* two races (Olympic and Whitney) exhibited a small degree of preferential homogametic mating. Although these species have approximately similar distributions in the wild they remain isolated from one another. There are indications that mating preference is genetical in origin and dependent on genes on the autosomes.

Earthquakes of the Pacific Coast of U.S.A. (1769–1928)

THE whole of vol. 29, No. 1 (Jan. 1929), of the *Bulletin of the Seismological Society of America* is taken up with this descriptive catalogue compiled by Sidney D. Townley and the late Maxwell W. Allen. It occupies 297 pages, earthquakes in California taking 232 pages whilst those of Oregon, Washington, Idaho, Nevada, Utah and Arizona take 44 pages in all, the remainder of the volume being concerned with the introductory remarks. The material used in the catalogue has been largely taken from the Holden

(1769–1897) and McAdie (1897–1906) catalogues, and since 1906 from notes by U.S. Weather Bureau observers, newspapers, magazines and the records of individuals and societies interested, all of which are acknowledged by the authors, and all of which have been carefully checked. The catalogue stops at 1928, since after that date the records have been kept and published by the U.S. Coast and Geodetic Survey annually. There are no figures or maps, and indeed it would be difficult to put all the matter accurately on a map unless it were drawn to an abnormally large scale, but it is hoped that in the near future Mr. Townley will arrange that this valuable information be arranged in geographical latitude and longitude order somewhat after the manner of Miss Bellamy's Catalogue, with cross references to the present work, as this would make it much more valuable from both the statistical and the ready reference points of view.

Detection of Nitrous Fumes

THE detection of nitrous fumes, which are encountered in many industrial operations and are dangerous poisons, is described in Leaflet No. 5, "Methods for the Detection of Toxic Gases in Industry, Nitrous Fumes" (H.M. Stationery Office. 3*d*. net) issued by the Department of Scientific and Industrial Research. The test depends on the Griess-Isolvay reaction. The atmosphere under test is drawn by a hand pump through a tube containing the reagent until a rose-pink colour of standard depth is reached, and from the number of strokes of the pump the concentration may be found from a table given in the leaflet.

Distribution of Carbon Isotopes

A SYSTEMATIC study of the relative abundance of the carbon isotopes ^{12}C and ^{13}C in various groups of materials has been made by A. O. Nier and E. A. Gulbransen (*J. Amer. Chem. Soc.*, **61**, 697; 1939) with a mass spectrometer of high sensitivity and high resolving power. The compounds studied were arranged in four groups: (1) igneous carbon (graphite, meteorite and diamond); (2) limestones; (3) plant sources; (4) various (dry ice, air, flesh, coal, etc.). The $^{12}C/^{13}C$ ratio found appears to depend upon the classification of the material. In general, the heavy isotope seems more abundant in limestones and the light isotope in plant forms. The maximum variation in the ratio was about 5 per cent. More data would probably provide a method of determining the origin of carbon compounds in Nature. If the $^{12}C/^{13}C$ ratio in air is assumed to be 90 ± 2, the atomic weight 12·012 is calculated for carbon, with the isotopic weights 12·0041 and 13·0079, and a conversion factor of 1·000275 in going from the physical to the chemical scale.

Structure of Triborine Triamine

TRIBORINE triamine, $B_3N_3H_6$, is iso-electronic with benzene. Fuller implications of this are brought out very elegantly by B. L. Crawford and J. T. Edsall (*J. Chem. Physics*, **7**, 223; 1939) from a study of the long-wave spectroscopy of $B_3N_3H_6$. They have examined the Raman spectrum of liquid $B_3N_3H_6$ and the infra-red spectrum of gaseous $B_3N_3H_6$. The symmetry of the molecule is D_{3h}, and it should therefore have twenty distinct internal vibrations. Of these, seven should appear in the Raman spectrum only (four should be polarized), three should appear in the infra-red spectrum only, seven should be common to both spectra, and three should be inactive in both spectra. These theoretical predictions have been substantially verified by the ascertained spectra, but the number of coincident frequencies is less than the predicted seven. However, by means of a normal co-ordinate treatment of the molecule, it has been possible not only to calculate the force constants of the various bonds but also to calculate all the fundamental frequencies, both active and inactive. This permits the assigning of all observed frequencies. One instance of an isotopic effect, due to molecules containing the isotope of boron of mass 10 has been noted and thermodynamic properties of $B_3N_3H_6$ have been calculated. The interesting comparison of the spectra and force constants of $B_3N_3H_6$ and C_6H_6 which is made leads the authors to favour the assignment of the benzene frequencies made by Lord and Andrews in preference to the assignment of Angus, Bailey, Ingold, and co-workers.

American Meter-testing Methods

IN Mr. Shotter's recent paper to the Institution of Electrical Engineers on April 14, several useful and novel methods of testing electric meters are described which deserve to be better known in Great Britain. He was struck by the fact that Americans have to a large extent eliminated the use of stop-watches in their electrical laboratories, the timing being effected by impulses from a standard clock. This is achieved by the aid of a photo-electric cell. The method consists of keeping a constant load on the rotating substandard electric meters, which are kept under test for a definite time period with the potential circuit of these instruments controlled from the standard clock. A method which appears to be becoming popular is the use of a rotating standard fitted with a stroboscopic attachment, one meter at a time being tested. With the types of meter the Westinghouse Co. is producing the method appears to be very satisfactory. Mr. Shotter saw also a chemical method for cleaning badly corroded and tarnished clockworks and other types of mechanism. The method employed consists in the use of a rotating cleaner containing one or more solutions in which the clockwork is immersed for a short time. Similar apparatus for cleaning watches and clocks has been on the market in the United States for some years. The method appears to have considerable possibilities. Microscopic examination of pivots and jewels was employed in all the servicing laboratories which the author saw.

Measuring Focal Lengths of Zones of a Mirror

W. H. NEWMAN'S paper entitled "A Method of Measuring the Focal Lengths of Zones of a Mirror for a Reflecting Telescope" (*J. Brit. Astro. Assoc.*, **49**, 5; March 1939) will prove interesting to all makers of specula. Instead of using a complete Ronchi grating, two fine slits were employed, or, to be more correct, two lines were ruled with a needle on smoked glass, their distance apart being 0·02 in. The glass was smeared with paraffin first as this facilitates the ruling of straight lines, whereas smoking the glass without this paraffin coating may lead to ragged edges. This modification of the Hartmann method of testing was discussed by experts at the meeting of the Association, and some of them were a little dubious of its utility.