

Research Items

Stone Age Survivals in Ireland

A MOUSTERIAN tradition surviving into the Campignian is very clearly exemplified in the industry of Rathlin Island investigated by Mr. C. Blake Whelan. The dangers of chronological assumptions based on comparative typology are here exposed on the periphery of 'neolithic' migrations. A striking example is afforded by a cordate or sub-triangular hand-axe of fine grained stone, a surface find from one of the numerous late prehistoric stations spread over the Rathlin uplands (*Antiquaries J.*, 15, 2), to which it is highly unlikely that a date earlier than 2500-2000 B.C. can be assigned. This dating is all the more probable in the light of the results of excavation, although the survival of the use of implements of fine grained rock to at least as late as the final Bronze Age or early Iron Age (500 B.C.) admits of a much later dating. It would be difficult to find a better example than this specimen of the survival of Levallois and Mousterian technique, upon which Goury, the present writer and others have based the postulate of an eastern focus at which, uninfluenced by any Upper Palaeolithic technique, the Mousterian evolved into the Campignian and, moving westward, absorbed and devised new forms which preserved the heavy aspect of the ancestral technique. The specimen under notice is a faithful reproduction of the cordate or sub-triangular hand-axe of cave Mousterian universally figured as type specimens of this epoch some sixty thousand years earlier.

Divination in Melanesia

AMONG the Tanga people, who occupy islands off the coast of New Ireland, Mandated Territory of New Guinea, great ritual importance is attached to death, and at one time a divinatory ceremony was practised when sorcery was suspected as the cause. One such ceremony, which took place long ago, has been described in detail to Mr. F. L. S. Bell by two aged men who themselves had taken part (*Man*, 90; 1935). It was performed in connexion with the unaccountable death of a young woman. The instrument of divination was a bamboo pole, about thirty feet long, to which was attached a bunch of highly perfumed leaves, believed by the natives to be a strong aphrodisiac. The ceremony was termed "Several men fish for the ghost", and it was believed that the leaves served as bait. The pole was raised on the shoulders of five or six men, who were distant relatives of the deceased. They then carried it to the place at which the woman was born, as the most likely spot at which her ghost would be found. When the pole became heavy on their shoulders as they marched, it was believed that they had encountered the ghost. It then fled to her husband's house, whither they followed it. Twenty men then clung to the pole, headed by one of the woman's cross-cousins, who began to question the ghost. It was essential that no one within the forbidden degrees should touch the pole, otherwise the ghost would not answer. The ghost was asked who was responsible for her death, individuals being mentioned by name. When the guilty person was named the pole began to vibrate violently and was drawn towards the interior of the house, the efforts of the twenty men,

however strong, being unable to prevent it. When the pole ceased to vibrate the men withdrew and the pole was placed by the side of the woman's grave. No punishment followed, except the ill-repute of being a sorcerer and consequent ostracism.

Identical Twins

IN a lecture on twins (*Eugenics Rev.*, 27, No. 1), Dr. J. A. Fraser Roberts reviewed the modern work on this subject. He favours a genetical rather than a physiological theory of identical twinning. A quiescent phase of the embryo occurs in the badger as well as the armadillo, but in the badger identical twins are unknown. Some identical human twins show mirror-image phenomena, but this is not true of the twins that are most nearly identical. It appears that mirror-image twins are due to a somewhat later separation of the embryo into two. The intelligence quotient of identical twins is not so largely inherited as stature and other physical characteristics. Nevertheless, it is concluded that even here heredity is more than three times as important as environment. Reference is made to the studies by Newman of twins reared apart, and it is suggested that similar comparisons should be made of twins reared together. The need for more accurate records of twin births by physicians is emphasised. Psychological studies should be made of the comparative effects of training on twins, following Gesell. The ideal would be a register and 'follow up' of all twin births.

Agranulocytic Angina

THIS is a rare disease characterised by severe sore-throat or tonsillitis ('angina') with fever and prostration, and frequently fatal. It was first described in 1922 by Werner Schultz (*Deutsch. med. Wochschr.*, 48, 1495), and a review on the subject by Dr. E. W. Adams, with bibliography, has been recently issued by the Ministry of Health (Rep. on Pub. Health and Med. Subjects, No. 76. London: H.M. Stationery Office, 1935. 6d. net). A remarkable and characteristic feature of the disease, from which it derives its name, is a diminution in the number of leucocytes or white blood-cells from the normal of 10,000-12,000 to 1,000 or less per c. mm. of blood, with an almost complete disappearance of the polynuclear leucocytes ('granulocytes'), which normally constitute 75 per cent of the total leucocytes. About a thousand cases of the disease have now been described, of which only twenty-two have been recorded in the British Isles. It is more common in females, and the fatality in the earlier cases was more than 90 per cent. The causation is obscure, but evidence suggests the action of some toxic agent. Much accumulated evidence points to a connexion with the use of the drug 'amidopyrine', and a case appears to have been made out incriminating the benzamine group of drugs. Dr. Adams has collected 140 cases, with 74 deaths, following the administration of amidopyrine, and two single doses of 10 grains and 5 grains of this drug have been found to cause an immediate and striking diminution in the granulocyte and total white blood-cell counts. Pentose nucleotide appears to exert a curative action, the mortality in cases treated with this agent being only 25 per cent.

New Sponges from the Puerto Rican Deep

DR. M. W. DE LAUBENFELS has described twenty-seven new species of sponges from the Puerto Rican Deep (Johnson Fund. Reports on the Collections obtained by the First Johnson-Smithsonian Deep-Sea Expedition to the Puerto Rican Deep. Smithsonian Miscellaneous Collections, 91, No. 17. Dec. 1934). Nearly one fourth of the total number of sponges collected by this expedition were new. Many of them may have been collected and described before, but unrecognisably, because in the descriptions made more than fifty years ago very little attention was paid to those microscopic characters that to-day are considered of primary importance. All the new species belong to the Demospongiae, and these belong to 17 families, of which 4 are new, and 26 genera, of which 11 are new. Only a few species belonging to the Calcarea (or Calcispongiae) and somewhat more of the Hexactinellida (or Hyalospongiae) were found, and apparently no new species of either of these two orders. A final report is in progress which will include these.

Aphid Transmission of Strawberry 'Yellow-edge' Virus

The constant association of 'yellow-edge' disease of strawberries with the presence of the tarsonemid mite (*Tarsonemus fragariae*) led to an investigation, by Mr. A. M. Masee, as to whether the mite was a vector of this particular virus disease (*J. Pomol. and Hort. Sci.*, 13, No. 1, pp. 39-53, March 1935) which showed that this relation does not hold. The strawberry aphid (*Capitophorus fragariae*), however, is proved to transmit the disease to healthy plants in the month of June, though there is some doubt about its ability to do so in late July and August. The tarsonemid mite causes severe damage on its own account, and frequently masks the appearance of virus symptoms.

Observations on Sorghum

Two short papers which have appeared in *Current Science* of February, 1935, describe "Bulbils in Sorghum" and "*Sclerospora* Sp. and Suppression of the Awn in Sorghum". The former article, by G. N. Rangaswami Ayyangar and V. Panduranga Rao, of the Millet Breeding Station, Coimbatore, India, announces the discovery of vegetative bulbils in place of grains in a small percentage of the progeny of a cross between single-seeded and double-seeded *Sorghum*. The second paper is by G. N. Rangaswami Ayyangar and P. V. Hariharan, and describes the symptoms of attack by a species of *Sclerospora* fungus. This has the effect, among other actions, of suppressing the awns of *Sorghum*. The leaf-blade is the most susceptible part of this plant in attack by *Sclerospora*, and as the awn has been considered homologous with the leaf blade, it seems natural that the awns should be suppressed, yet curious that organs of such divergent morphology should be attacked so specifically.

Petroleum Fuels in Canada

THE Mines Branch, Department of Mines, Canada, in co-operation with the Dominion Fuel Board, has recently issued Bulletin No. 759 on deliveries of fuel oil, kerosene, gasoline and petroleum coke in Canada during the last few years. In this statistical survey, fuel oil comprises all grades heavier than

12° A.P.I.; kerosene, the white and amber grades ranging from 42° to 47° A.P.I. plus distillate oils coming within these ranges; and gasoline those grades having 55° A.P.I. or lighter as their gravity. Statistics collected are presented in the form of eight tables showing gallons of the four classes of petroleum fuels marketed in Canada and their distribution in the provinces in 1932 and 1933; the amounts of fuel oil and kerosene delivered in the provinces and a classification of their specific uses; the sales of gasoline (and motor fuel) in Canada by provinces, and finally data of petroleum coke deliveries for domestic and industrial heating. Several interesting facts emerge from these statistics. In 1933, deliveries of petroleum products in Canada for fuel purposes amounted to 945 million Imperial gallons, of which 419 were fuel oil, 42 kerosene and 484 gasoline. Of the fuel oil delivered, 27 per cent was used for domestic heating, 21 per cent for industrial heating, 3½ per cent for tractor fuel and nearly 49 per cent for locomotive and bunker fuel. Of the kerosene delivered in 1933, representing approximately one twentieth of the aggregate of petroleum fuels, 54 per cent was accounted for by domestic heating, 37 per cent by tractor fuel and 9 per cent by general uses. As regards gasoline, statistics of sales show that in 1933 approximately 88 per cent was sold for motoring purposes and 12 per cent for other general uses.

Measurement of Solar Radiation

PROFESSIONAL Note No. 68 of the Meteorological Office, by Mr. H. L. Wright, contains comparisons between readings of the following instruments made at Kew Observatory in July-November 1927: (1) the Gorczynki pyrheliometer, (2) the Campbell-Stokes sunshine recorder, (3) the black bulb thermometer *in vacuo*. Of these three instruments, only the first represents a serious attempt to deal quantitatively with solar radiation; the second allows a rough estimate to be made of the length of time during which the radiation is above the minimum required to scorch the card of the recorder; the third purports to give a measure of the maximum intensity of the solar radiation each day by recording the highest temperature reached by a specially blackened maximum thermometer in a glass-walled chamber from which, as far as possible, all air is removed. Official meteorology, in Great Britain at least, has not of late taken the black bulb thermometer seriously, and the records of this instrument do not appear in the regular official publications. Among the comparisons is a diagram showing daily totals of radiation obtained with the pyrheliometer plotted against the estimated durations of bright sunshine given by the Campbell-Stokes instrument. This shows that the average daily rate at which radiation is received at a surface normal to the sun's rays at Kew under the best conditions is 0.95 gm. cal./cm.² per minute, that is, about half the solar constant. The highest instantaneous rate was 1.43 gm./cal. on September 24, 1927, in polar air behind a depression over the North Sea, with the barometer down to 985 millibars and rising briskly. Comparisons between the widths of the burns on the cards of the sunshine recorder and the associated rates of radiation give an exponential relationship, the rate of radiation being proportional to e raised to the power $0.64w$, where w is the width of the burn. The recorder was found to be insensitive to radiation of less than about 0.2 gm./cal. The figures relating radiation to the black bulb

readings are of interest mainly in that they show how well founded are the official objections to the latter instrument. It appears that the maximum rate of radiation for a given black bulb maximum is much less in July and August than in October and November.

A New Theory of Atmospheric Electricity

IN a long paper, published in the March issue of *Terrestrial Magnetism and Atmospheric Electricity*, Ross Gunn develops a new theory which claims to explain the generation of electric charges in clouds as well as many cognate phenomena. The theory depends on what its author calls "some preliminary and not very well-controlled experiments . . . devised and carried out as a result of certain theoretical considerations". A small 'pill-box' of thin sheet tin was connected to an electrometer. An iron disc was reduced to the temperature of carbon dioxide snow and quickly placed inside the pill-box. As the box cooled, water condensed on the outside and the box acquired a negative potential, about -0.1 volt; then, as the pill-box warmed up, condensation ceased and after a minute or two the potential became positive. Gunn accepts the experiment as sufficient demonstration that condensation produces negative electrification of the water and positive electrification of the air, whilst evaporation produces positive electrification of the water and negative electrification of the air. Other investigators have looked in vain for such results of condensation and evaporation. Gunn assumes that these processes go on in the clouds and says that when raindrops are formed in an ascending current, the drops acquire negative charges whilst the positively charged air passes up to the top of the cloud. It may be remarked that the Ross Gunn cloud, like the Wilson, would have a positive charge above, and a negative charge below. Whether clouds of this type really predominate is a question which should have been settled long ago.

The Rectifier Photocell

A RECENT article by G. P. Barnard (*Proc. Phys. Soc.*, May) gives working details of the preparation of a new selenium-sulphur photo-cell of the 'Sperrschicht' type and an account of its properties. Photo-cells of this general type are obtainable commercially, but hitherto there has been no account sufficiently detailed to allow the construction of a cell for any special purpose. The cells were made by coating iron discs with the molten selenium-sulphur mixture, annealing, and sputtering lightly with gold, silver or platinum. The heat treatment of the films is critical; the active layer consists of selenium embedded in a matrix of sulphur-selenium eutectic in which the sulphur enters the selenium lattice. Theories of the behaviour of the cells have been given by A. H. Wilson and by Frenkel and Joffé. Both theories involve the assumption that in the system metal-semiconductor-metal there is a definite gap at one of the interfaces. The experimental behaviour of the cells is rather complicated because the illuminated cell behaves as a source of E.M.F. shunted by one resistance and placed in series with another. The behaviour varies, therefore, with the characteristics of the external circuit. It is expressed in the paper by sets of curves, and compared where possible with theory. The spectral sensitivities of some of the cells were measured.

Migration of Sodium on Tungsten

R. C. L. BOSWORTH (*Proc. Roy. Soc.*, A, May 1) has investigated the mobility of adsorbed sodium atoms. A patch of alkali atoms was sprayed on to a tungsten strip as positive ions from a Kunsman filament, and the movements of the sodium were followed by exploring the strip with a sharply defined spot of light and making use of the photo-electric effect of the sodium-covered surface. It was first found that an active patch decayed with time, apparently due to a migration of sodium into the intercrystalline cracks of the tungsten. The sodium could be partly recovered by heating the strip to $1,300^{\circ}$ K., and, after about 10^{17} atoms had been deposited per sq. cm., the strip was saturated and the surface layer remained stable. When a patch had been obtained, it was found that it spread over the surface at an appreciable rate at room temperature and more rapidly at 800° K. At the latter temperature the strip is approximately uniformly active after 5-10 seconds. The temperature variation of the diffusion process is used to obtain an 'activation energy' for the migration process. The results are interpreted by supposing that a sodium atom may take up the activation energy of about 0.25 volt and pass into a mobile state in which it can migrate for considerable distances, either over the surface or into the cracks.

Stellar Motions

IN "A Preliminary Note concerning a New Theory of the Motions of the Stars" (*Proc. Nat. Acad. Sci.*, 21, 143; 1935), J. Schilt describes what might better be called a new empirical analysis of these motions. He has first taken known rectangular velocity-components \dot{X} , \dot{Y} , \dot{Z} of A-type stars, and chosen his Z -direction in such a manner that the density of velocity-points has maximum gradient in this direction. He then fixes attention on the \dot{Z} -velocities, rather than on the velocity components in the preferential direction determined in the more usual way by use of the velocity-ellipsoid. The Z -velocity component for any star is expressible in terms of the angle between the direction of the star and the Z -axis, and the observed values of its parallax π and of its radial and proper motions. Schilt finds that it can be represented statistically as the sum of one of two constant values, and an 'expansion' term proportional to the Z -co-ordinate. The resulting relation can be solved for π , thus giving a new expression which may be used to obtain statistical parallaxes of stars from a knowledge of their velocities. The author has verified that a formula of this type is successful in a large number of cases in giving parallaxes in agreement with trigonometric values. He claims that it makes it possible to gain insight into the 'giant' part of the Hertzsprung-Russell diagram, where spectroscopic and trigonometric parallaxes are not available. He further considers that his analysis gives a better account of the distribution of radial velocity than does the 'double wave' representation suggested by the theory of galactic rotation. However, from the theoretical, as opposed to the empirical, point of view, the work must ultimately be tested in the light of some very general considerations regarding the properties of arbitrary velocity distributions, which have lately been brought forward by E. A. Milne (see *Observatory*, 58, 167, June 1935).