

Research Items.

INDIAN ARCHÆOLOGY.—A "Note on Prehistoric Antiquities including Antiquities from Mohen-jo-daro" by Mr. Ramaprasad Chanda, Superintendent of the Archæological Section of the Indian Museum, Calcutta, which was written for a visit to the Museum made by the Viceroy in December last, gives a valuable bird's-eye view of the archæology of India as illustrated by exhibits in the Museum. The specimens include palæoliths from the Deccan, the Central Indian Plateau, Rajputana, and Eastern India. These approach most nearly to the Chellean and Acheulean types. Typical neoliths have been collected from nearly all the provinces of India. Of the remains of the Copper Age, which followed the Neolithic in Northern and Central India, the most remarkable are the hoard from Gungeria, Central Provinces, consisting of 424 hammered copper implements and 102 thin silver plates, and a find of nine double axes from the Gulpha River in the Mayurbhanj State. Antiquities found at Mohen-jo-daro and Harappa are now on loan in the Museum, among them being the seals with the unknown pictographic script, the pottery, and other objects which, it is suggested, show Sumerian affinities. It is not generally known that three seals showing this pictographic script were discovered at Harappa in 1872 and in the 'eighties of the last century and were presented to the British Museum, where they are now exhibited.

RACIAL CHARACTER.—An interesting question is raised in two papers published in the Proceedings of the American Philosophical Society, vol. 63, No. 2, which discuss the question of potential equality in the various races of man. In the first, Dr. H. N. Hall maintains that if the test of history be applied to the negro race, and its past examined with the view of predicting its future, it appears that its mental disposition remains unchanged and seems unchangeable. The argument is based upon a study of the culture of the negro and, in this instance, the divine or magical character of the kingship which in Africa, owing to the absence of social or political checks which elsewhere served as a counterbalance to the royal divinity, was incapable of useful development. This was the result of a weakness of will in the negro mind which necessitated the support of a superior. Dr. Goldenweiser, on the other hand, argues that neither physically nor biologically are there any differences in the races of man which permit a grading into a progressive series from the animal upward, as, *e.g.*, in the case of hairiness, which is extreme in the Australian and European, but slight only in the Negro, Mongol, and American Indian; nor has psychology yet furnished any evidence to assist in grading, while the tests of culture, religion, and morality depend upon a bias determined by our own point of view.

POLLINATION AND COMMERCIAL FRUIT GROWING.—Among the many factors that affect the good or bad cropping of fruit orchards, it has become recognised that self-sterility or self-fruitfulness plays a very considerable part. Numerous experiments have shown that comparatively few varieties of the more important fruits are able to produce good crops unless they are cross-pollinated from another variety growing near by, and to this fact the poor cropping power of certain orchards is largely to be attributed. C. H. Hooper, in "Fruit Pollination in Relation to Commercial Fruit Growing" (Fruit Bull. 10, S.E. Agric. Coll., Wye), sets out the analysed results of his own and many other records, the compiled lists affording definite guidance to fruit planters. The

smaller soft fruits all appear to be perfectly self-fruitful, but most need the agency of insects to effect cross-pollination from other plants of the same variety, strawberries being almost the only crop which is chiefly fertilised by wind. In the case of apple, pear, plum, and cherry, however, many varieties are unable to mature fruit with their own pollen; every orchard should thus contain at least two varieties flowering at approximately the same time and capable of cross-fertilisation. The difference between the earliest dates of flowering of varieties of the same fruit is considerable, averaging about twenty days for apples, twelve for pears, nineteen for plums, and three weeks or more for cherries. The chief varieties are listed according to whether they are earliest, early, mid-season or late, and an indication is given of the degree to which each is self-sterile or self-fruitful. In addition, examples are given of varieties that have been proved by experiment to fruit well together, and the recommendation is made that if trees of one variety only have been planted, about one tree in eight should be regrafted or replaced by another variety flowering about the same time. For apples, Bramley's seedling is suggested as a specially good variety with which to re-graft. The importance of insects in fruit pollination is emphasised, and bee-keeping is recommended for growers with large areas of a certain fruit. Many other factors are recognised as influencing fruitfulness, but the question of imperfect fertilisation of the flower is less usually recognised, and is of sufficient importance to justify special attention being directed to its possible occurrence in cases of persistent poor cropping.

THE PRACTICE OF ENSILAGE.—Silage has now become of considerable importance as a stock food, after a somewhat chequered history, and Amos (Journ. Min. Agric. 31, Nos. 8, 9, 11) outlines the present-day knowledge of the process of ensilage and the methods practised in Great Britain. The quality of silage varies much with the conditions of manufacture, sweet, acid and green "fruity" silage all being recognised as desirable types, whereas sour and musty silage cause much loss, as stock often refuse to eat them. Almost all herbaceous plants, with the exception of those of the cabbage tribe, can be made into silage, though all are not equally suitable. Tares and vetches, mixed with a supporting crop of oats, rye or beans, give most satisfactory results, providing silage of excellent food value, readily eaten by stock. In other parts of the world maize has proved the greatest value for silage from every aspect, but as it is very sensitive to frost it is necessary, in Great Britain, to select special varieties bred and selected for habits of quick maturity, Saltger's North Dakota and Longfellow being recommended in place of the White Horse Tooth generally grown. Sunflowers, rotation grasses, clovers and meadow grass can all be made into silage when occasion demands, but sunflower silage is less palatable than the others. A silage crop should be cut in a state of maturity rather more advanced than for haymaking, and second crops of seeds may be ensiled just after the corn harvest, maize being left to the last. The best silage results from a crop which is ensiled immediately after cutting, and careful organisation of labour is necessary to attain this end. Care is needed in filling the silo to obtain uniform shrinkage and to avoid undue spoiling and wastage in the upper layers. Various methods are advocated to reduce this wastage, but none seem to be of real economic value, and a suitable cover for the top of a tower silo remains to be invented.

BIG BUD OF THE BLACK CURRANT.—We have referred on two occasions (NATURE, May 26, 1923, p. 719, and March 22, 1924, p. 439) to an experiment being conducted at the Crichton Royal Institution, Dumfries, on the eradication of big bud of the black currant, due to a mite. In 1922 the plot of 400 affected bushes was cut down and thoroughly fired. The bushes made good growth and flowered in 1923, and again in 1924, but failed to fruit, and have shown marked indications of reversion. Finally, last October, 60-80 per cent. of the bushes showed re-infection by the mite (Annual Report for 1924, Crichton Royal Institution, Dumfries, p. 23). The experiment, therefore, which gave much promise of success during the first year, has proved a failure, and the bushes have now been destroyed.

THE CONTROL OF TSETSE FLIES.—In the *Bulletin of Entomological Research*, vol. 15, Jan. 1925, Dr. W. A. Lamborn gives an account of an interesting experiment which he has carried out in Nyasaland. In this instance an attempt has been made to ascertain whether it is possible to obtain some measure of control of the species of tsetse fly, *Glossina morsitans*, by artificially increasing the existing numbers of an apparently promising parasite in the fly area. The parasite is the small chalcid *Syntomosphyrum glossinae* Waterst. which lays its eggs in the puparia of the Glossina. The resulting larvæ devour the tissues of their hosts, thereby destroying them. The chalcid is a favourable subject for the experiment, since it is a very prolific and rapid breeder, and is readily dealt with under artificial conditions. It has the further advantage of being easily reared from puparia of flesh flies (Sarcophaga) and other Diptera. A stock of this parasite was built up in the first instance from eleven females bred out from a single Glossina puparium. These parasites were introduced to a number of Sarcophaga puparia, and the resulting chalcids were then utilised to parasitise a still larger number of the host. Eventually, a large stock of parasitised puparia were deposited in the breeding places of the tsetse fly, so as to ensure that the emerging chalcids would be liberated in a favourable environment. It was estimated that, on an average, 67 examples of the *Syntomosphyrum* issue from each puparium, and that more than 277,000 parasites (mainly females) had emerged from the distributed examples. Prior to the experiment the normal parasitisation of the Glossina in the area under consideration was found to be only 0.4-0.6 per cent. In the year following the distribution, the parasitisation had risen to 8.7 per cent. This result, although encouraging, is still a far step from having effected a degree of control of real practical value; nevertheless, it suggests that possibly a still larger output of the parasite might be worthy of trial.

OBSERVATIONS ON BRITISH COCCIDÆ.—Under this title Mr. E. E. Green publishes in the *Entomologist's Monthly Magazine* for February his ninth contribution of the series, on British scale-insects. In the present paper four new species are described and figured, and among them *Kuwania pini* n.sp. is notable as providing the first record of a coccid occurring on pines in the British Isles. *Pseudococcus phalaridis* n.sp. from Frimley, Surrey, is recorded as being preyed upon by the larvæ of a fly which was identified by Mr. J. E. Collin as *Ochthiphila polystigma*. This enemy proved so efficient that, a little later on, the particular colony of the new species of coccid had been practically exterminated. Mr. Green suggests that this fly might possibly prove useful to check the ravages of the allied coccid, *Trionymus sacchari*, upon sugar-cane in Egypt and elsewhere. Among other

scale-insects the occurrence of *Eriococcus hoheriae* Mask. on *Hoheria populnea* in the Scilly Isles is of interest since it is the first record of this insect being found away from its original home (New Zealand). It has doubtlessly been imported with the plants from that country. The many recent additions made to our knowledge of British scale-insects by Mr. Green is but one example of how much work there still remains to be accomplished in working out the more obscure families of the British insect fauna.

LIGIA NOVÆ-ZEALANDIÆ IN SOUTH AMERICA.—Prof. C. Chilton records (*New Zealand Journ. Sci. and Technol.*, vi. p. 287, 1924) the occurrence at Valparaiso of the shore isopod, *Ligia novæ-zealandiæ*, a species which is found also in New Zealand and Juan Fernandez. These isopods carry their eggs in brood pouches under the body until the young are hatched in a form resembling the adult, and hence it is unlikely that they could cross large tracts of ocean. The existence of this species in the three places referred to is held to be additional evidence in support of a former land connexion between them. The shore amphipod, *Orchestia chilensis*, which lives under similar conditions to the *Ligia*, is also found on the shores of Chile, Juan Fernandez, and New Zealand.

THE DEVELOPMENT OF THE MALE GENITALIA OF HOMOPTERA.—An extensive literature has grown up around the subject of the structure and homologies of the male genitalia of insects. The nomenclature of the different parts is highly involved and it is often extremely difficult to trace their homologies in different orders. In the *Quarterly Journal of Microscopical Science*, vol. 69, part 1, Dec. 1924, Dr. Hem Singh-Pruthi has an important contribution to this subject with particular reference to the Homoptera. In these insects he finds that the male genitalia consist of two pairs of lateral appendages, the sub-genital plates and the parameres, and a median copulatory organ, the ædeagus. They are all borne by the ninth abdominal segment. They develop from two pairs of appendages only, an outer and an inner, which appear as diverticula of the ventral region of the ninth segment. The outer pair develops into the sub-genital plates, and the inner by longitudinal fission becomes two pairs; the inner one of the two pairs so obtained, by the fusion along the median line of its components, forms a single organ, the ædeagus, while the outer is transformed into the parameres. Thus the pair of appendages developing into the sub-genital plates does not belong to the eighth segment, as was believed by Kershaw and Muir, but to the ninth; there are no appendages on the eighth in the nymphs or in the adult; nor is there any evidence in favour of these authors' view that the male gonopore in Homoptera, unlike that in most orders of insects, lies between the eighth and ninth sternum; it is in its usual place, behind the ninth sternum. The sub-genital plates seem to be the coxites of the ninth sternum; and both the ædeagus and the parameres, derived from a primitively single pair of appendages, correspond to the endopodites.

METEOR CRATER, ARIZONA.—A letter to the *Engineering and Mining Journal-Press* for February 7, from Mr. L. F. S. Holland, superintendent with the Company the recent drilling operations of which under the rim of Meteor Crater have aroused widespread interest, prompts us to refer once more to the origin of this puzzling "crater" (see NATURE, February 14, p. 244). Mr. Holland is chiefly concerned in correcting the many false impressions that have been spread abroad by enthusiastic but largely misleading journalism. He confirms the presence of platinum in the

iron meteorites of the neighbourhood, giving the average as one ounce of platinum to five tons of meteorite. An American Sunday paper has published a photograph of an apparently large diamond alleged to have been embedded in an Arizona meteorite. Possibly the magnification was not stated, but the truth of the matter is that, while diamonds do occur, they are invariably of microscopic dimensions. Of more importance is Mr. Holland's belief that the crater can be best explained by the impact of a shower of meteorites. However, he doubts whether the recent boring went far enough to prove or disprove Barringer's latest theory that the main mass of the meteoric shower became embedded under the southern rim at an angle with the surrounding plain.

THE PETROLOGY OF PENMAENMAWR.—The differentiation of the magma which is now represented by the interesting intrusion of Penmaenmawr is discussed by H. C. Sargent in a recent paper (Proc. Liverpool Geol. Soc. vol. xiv., 1924, pp. 82-98) which supplements his earlier work on the various rock-types. Below the 1000-foot contour the rock is a very fresh enstatite-porphyrite with labradorite as the dominant mineral. Above this level the plagioclase becomes less calcic, gradually reaching oligoclase, while quartz and orthoclase, mainly present as micropegmatite, steadily increase upwards. The author ascribes the differentiation to the inhibition of reaction between the earlier-formed crystals and the residual liquid (shown by the existence of zoned feldspars), accompanied by the straining-off of the more siliceous and alkaline material in which the volatile constituents would also be concentrated. He considers it is not safe to assume that sinking of crystals has been an important process, as the grain-size shows no marked variation with height. But the process outlined would not provide an upper concentration of quartz and orthoclase unless the other minerals became concentrated downwards, so that relative movement of crystals and residual liquid is logically implied. The influence of volatile fluxes is shown by the increasing turbidity of the feldspars as they are traced upwards, by the production of bastite, epidote, and other alteration-products, and by the scarcity of biotite in the higher horizons. It is clearly pointed out that these features cannot be due to weathering. In the upper part of the adjoining Craig Lwyd area hornblende is abundant, but so far no explanation is forthcoming to explain this mineralogical difference. There seems to be a lateral as well as a vertical differentiation, the south-eastern portion being richer in lime and the north-western richer in potash, thus suggesting that the intrusion may have come from the south-east. Part II. of the paper, not yet published, may throw further light on these speculations.

THE AGES OF RADIOACTIVE MINERALS.—The measurement of geological time by methods based on the decay of radioactive substances is now receiving renewed attention in the United States. The National Research Council has appointed a committee under the chairmanship of Prof. A. C. Lane, to investigate the subject, and the committee has performed a valuable preliminary service by issuing a bibliography of the literature by R. C. Wells. In Canada the Geological Survey has assigned to H. V. Ellsworth the task of applying the methods to Canadian problems. A first paper from his pen is now published in the *American Journal of Science* for February 1925, and gives the results of several new analyses, and a valuable discussion of the principles involved. Hitherto it has been found

that when thorium is a noteworthy constituent of a series of minerals, the lead-ratios derived from them are too variable to be trusted, and the tendency has therefore been to ignore such minerals in the expectation that sooner or later the discrepancies associated with thorium would be explained. This course has been followed without detriment to the development of the subject, since for uranium minerals in which thorium was not an important constituent the results have been concordant among themselves and with the geological evidence. Ellsworth, however, in calculating the ages of a series of uraninites from the pegmatites of Ontario, has taken thorium fully into consideration with results that are a little more consistent than they would have been had thorium been ignored. The ages vary from 1115 to 1189 million years, with an outside figure based on considerably altered material of 1299 million years. These values agree very closely with those obtained from minerals of Middle pre-Cambrian age occurring in Scandinavia, Africa, India, and the United States. Before any further advance can be made, apart from the accumulation of analyses, it is essential that the half-periods of thorium and uranium should be re-investigated in relation to the possibility of isotopes of the parent elements, and that the genetic connexion of thorium and uranium, if there be one, or has been one, should be disentangled from the conflicting evidence.

VELOCITY OF DIFFUSION, VISCOSITY, AND EXTERNAL PRESSURE.—Messrs. E. Cohen and H. R. Bruins describe, in the *Zeitschrift für physikalische Chemie*, January 20, a new apparatus for determining the viscosity of mercury at high pressures. The ratio of the viscosity at 1500 atmospheres pressure to that at one atmosphere is found to be 1.048, at temperature 20° C. In their previous investigation into the effect of pressure on the velocity of diffusion of cadmium in mercury, at the above temperature, it was found that the ratio of the velocity of diffusion at one atmosphere to that at 1500 atmospheres is 1.051. It follows then that, within the limits of accuracy of the diffusion measurements, the product of the viscosity and velocity of diffusion is the same at one and at 1500 atmospheres. This agrees with the results of previous investigations of the authors, which showed that the velocity of diffusion at atmospheric pressure was inversely proportional to the viscosity, even when the molecules of the diffusing substance and of the medium into which diffusion took place were of equal size.

STARK EFFECT IN METALLIC ARCS.—In the *Japanese Journal of Physics*, vol. 3, p. 45, H. Nagaoka and Y. Sugiura describe an investigation of the Stark effect produced in the electric arc for a number of metals. It was first necessary to stabilise the arc, and this was done by introducing a capacity of more than one microfarad and a large self-inductance between the electrodes, and using a P.D. of 500 volts obtained from a direct current generator. By employing carbon as the cathode and the metal under test as the anode, arcs of 7 cm. in length were maintained with perfect steadiness. The potential changes along the arc were examined, and the electrodes were found to be the seats of strong electric fields due to the presence of an electric double layer which is formed when the current surpasses a critical value. Using a small drop of metal at the anode, fields of the order of 10^6 volts per cm. were obtained, and the Stark effects in these fields were studied. It was found that, with several metals, lines belonging to the same spectrum series were similarly affected, the nature of the change being different for different series, and that the effect increased with the term number.