

## RESEARCH ITEMS

## India and Crete

A SIMILARITY between pottery found at Maniyar Math in Rajgir, southern India, and finds in Crete is suggested by J. G. Aravamuthan in *Man* of December 1939. The Indian pottery vessels are attributable to an age roughly anterior to the Christian era, and are said to bear spouts varying in number from four to twenty, or even thirty-four in one instance. On the spouts were designs described as "serpents, sieves, animals, etc.". Associated with the finds were terra-cotta images of hooded snakes and a large stone slab containing a number of hooded figures. Mani Naga was the protector and rain-giver of Rajagirha. The name of the god implies association with the serpent. Finds in Crete resembling the Indian vessels appear to be adaptations of drain-pipes, on which the representation of snakes moulded in relief in certain instances points to their use as places of refuge for snakes, while cups on the outside might be used to supply them with milk or other refreshment. In another type a snake is coiled around a naturally formed honeycomb. In still another a snake peeps into the mouth of the jug. Several show snakes approaching or peeping into a cup. The earliest known of this class is a vessel in the form of a female with snakes coiling round the neck. The Cretan vessels are thus multifarious in form and have evolved into a number of varieties. The Rajgir spouted and perforated vessels embody features found in one or other of these varieties. The link between India and Crete seems evident, but beyond relation to a snake cult and a necessary connexion with bringing down rain, the purpose is obscure.

## Volcanic Action in Minoan Crete

SIR ARTHUR EVANS has suggested that the catastrophes which archaeological research has revealed overwhelmed the Cretan palaces of the Minoan civilization were caused by earthquakes. An alternative theory that they were due to volcanic action from the island of Thera similar to the explosion of Krakatau in 1883, is put forward by Sp. Marinatos in *Antiquity* of December. The ground for this suggestion is the result of a recent excavation on the site of Amnisos, a settlement on the coast of Crete, destroyed at the same time as Nirou Khani, Malia, Gournia, Zakro, and perhaps others. At Amnisos one of the buildings, quite near the sea, at the deeper levels was buried under a mass of pumice stone and sand, and a square pit inside the building was full of pumice stone. A reconstruction of the catastrophe suggests that sea waves broke over the building and carried it away almost to its foundations. It was abandoned and later the north breezes brought the pumice stone from the volcano. This receives support from the fact that the pieces of pumice were all small, rounded and polished like pebbles. At the "Villa of the Frescoes" higher up the beach there was no pumice, but the walls had collapsed in a remarkable fashion due to some tremendous natural force—surely the waves after an eruption. It has been pointed out that much additional support from excavation on selected sites would be necessary to convince archaeologists generally of the truth of this explanation.

## Toxicity of Indene

THE destructive action of heavy coal tar naphtha on the bed bug appears to depend largely on the presence of unsaturated constituents, especially indene ( $C_9H_8$ ). The high price of this hydrocarbon prohibits its use on a large scale, but the indene content of naphtha can be increased without unduly raising the cost, and information concerning the toxicity of indene to man is therefore desirable. G. R. Cameron and Cecile R. Doniger have investigated its toxic effects on rats, mice and guinea pigs, and find that in high concentration or on administration of large amounts it causes necrosis of organs such as the liver and spleen. Indene cannot therefore be regarded as a highly noxious agent; but the authors consider that a limit should be imposed on the indene content of such insecticides as heavy coal tar naphtha (*J. Path. and Bact.*, 49, No. 3, 529).

## Control of the Potato Root Eelworm

IN experiments carried out on small field plots at the Albert Agricultural College, Glasnevin, a very promising degree of control of the potato root eelworm, *Heterodera schachtii*, has been obtained by J. Carroll using trap-cropping with potatoes. Sprouted potatoes were planted in plots of 'potato sick' land on April 1, 1938. Five weeks after planting date the plants, and tubers from which they grew, were removed from the soil. No effort was made to remove the roots of the plants as this was found to be unnecessary. After removal of the trap crop plants, turnips were sown in the plots. In 1939 very good crops of potatoes, showing no obvious over-ground symptoms of eelworm infestation, were produced on the plots which had been trap-cropped in 1938. Control plots exhibited typical severe symptoms of eelworm infestation. Further experiments demonstrated that the removal of two successive trap crops in one season did not produce markedly better results than the removal of one trap crop. Experiments are proceeding on a larger field scale.

## Trisomic Nicotiana

T. H. Goodspeed and P. Avery (*J. Gen.*, 38, 381-458; 1939) have given an account of the trisomic and other types found in *Nicotiana sylvestris*. 164 trisomic plants including eleven different primaries, 21 tetrasomics, 45 double trisomics, 13 triple trisomics and 30 variant trisomics have been found in about 9,000 plants. These have arisen from irradiation by X-rays, from plants homozygous for a gene causing asynapsis, or from the cross triploid  $\times$  diploid. The morphological appearance of the trisomics are described, while the presence of an extra fragment also has a characteristic effect. Transmission of the primary trisomics through pollen and ovules is relatively high, but varies with the particular trisomic. The chromosomes of *Nicotiana sylvestris* and their relationship to nucleolus formation are described. The somatic expression of diploid *N. sylvestris* represents an interaction of the various growth rates of organs and tissues which differentiate the primary trisomics.



### Breakdown in Stored Plums

INTERNAL breakdown is common in plums stored for protracted periods at low temperatures. The variety Monarch, which is particularly susceptible to this type of trouble, has been studied at various storage temperatures by W. H. Smith (*J. Pom. and Hort. Sci.*, 17, 284; 1939). The fruit, which was 'pre-climacteric' at the time of picking, was divided into 'more mature' and 'less mature' batches and stored at seven temperatures between 65° F. and 31° F. Samples were removed from store at intervals of seven days and cut open for examination. Greater maturity at picking had the effect of advancing the time of the first appearance and maximum development of physiological breakdown. The relative amounts of breakdown at different temperatures were unaffected by differences of maturity. Maximum breakdown after 14–21 days of storage occurred at medium temperatures. After longer periods higher maxima occurred at progressively lower temperatures. The minimum percentage of breakdown always occurred at 34° F., the amount rising rapidly at both lower and higher temperatures. Two distinct types of injury, appearing as 'internal browning' and 'jellying', were recognized. At 45° F. and above, the plums are susceptible only to jellying, this type of injury falling to nil with rise of temperature. At 34° F. and below, they are susceptible only to browning, susceptibility increasing rapidly with reduction of temperature. Between these temperatures both types of injury may occur in the same plum or different plums in the same batch.

### Rose Propagation

Rose cuttings generally root with considerable difficulty, yet little work on propagation by stem cuttings has hitherto been undertaken. Dorothy Brandon (*J. Pom. and Hort. Sci.*, 17, 233; 1939) has studied the differences in rooting properties of a large number of members of the genus *Rosa* and the effects of various treatments to encourage rooting. The suggestion that high starch content is correlated with easy rooting has been likewise examined. Hardwood cuttings of twenty-six species and varieties were taken at intervals throughout the winter, the highest percentage of rooting being obtained in the period October–December. June was found to be the best time for inserting softwood cuttings. The effects of treatment with ethylene chlorhydrin, thio-urea, sodium nitrate, glucose, and indolyl acetic acid were tried. The two latter increased rooting slightly whilst the two former substances depressed it. No treatment was found to give results sufficiently beneficial to be of practical value. Fluctuations in starch content during the season varied according to species and variety, botanically related species and varieties falling into the same groups. Starch persisted throughout the winter in some species and disappeared in others. No correlation was found to exist between the starch content of cuttings and facility of rooting.

### Kernel Smut of Sorghum

A SMUT disease of the Sorghum plant causes damage in Egypt, but Dr. A. F. El-Helaly has recently shown that it can be controlled at negligible cost by treatment of the seed with an appropriate fungicide ("Studies on the Control of Kernel Smut of Sorghum". Min. Agric. Egypt, Tech. and Sci. Service Bull. 233. Govt. Press, Bulâq, Cairo, 1939. P.T.3). The disease

is caused by the fungus *Sphacelotheca Sorghi*, and is usually most severe upon early sowings of the host crop. The range of temperature within which both grain and fungus spores will germinate is wide in the months of April and May, but becomes narrow in June and July, being so limited in the latter month that the disease is rare. 'Herati' sowing, where the soil has a considerable water content when the seed is sown, favours the parasite more than the 'Afir' method of sowing in dry soil which is irrigated later. Control was obtained by treating the seed with organic mercury germicides, either 2.5 or 5 gm. of agrosan G per kilogram of seed, or a 1–2 per cent solution of uspulon or germisan. An interesting effect was demonstrated with sulphur and copper carbonate, the toxic effect of which was increased by using soil filtrate in place of distilled water in the preparation of fungicidal liquid.

### Composition of Ancient Greek Bronze Coins

A LONG monograph by E. R. Caley on "The Composition of Ancient Greek Bronze Coins" contains a large number of analyses and four plates of microphotographs (*Mem. Amer. Phil. Soc.*, 11). One interesting general result of the study is the variation in the proportion of tin and lead in the bronzes, the amount of lead increasing in the more debased coinage of later periods. The author discusses the probable causes for this varying ratio. Re-melting old coins with lead was one cause; others were the technical requirements of minting, adverse economic conditions, disruption of trade by wars, and scarcity of tin. The study is of considerable archaeological and historical, as well as chemical interest. It is published at 2.50 dollars by the American Philosophical Society, Philadelphia.

### Stereochemistry of Complex Inorganic Compounds

THE reaction of dichloro-diethylenediamine cobaltic chloride,  $[\text{Coen}_2\text{Cl}_2]\text{Cl}$ , with potassium and silver carbonates was the first example of the Walden inversion in the field of inorganic complex compounds, the *l*-form being converted into the *d*-form of the carbonate compound,  $[\text{Coen}_2\text{CO}_3]\text{Cl}$ , in the case of potassium carbonate, and the *d*- or *l*-forms of  $[\text{Coen}_2\text{CO}_3]_2\text{CO}_3$  in the case of silver carbonate. J. C. Bailar and J. P. McReynolds (*J. Amer. Chem. Soc.*, 61, 3199; 1939) have now prepared two diastereoisomeric forms of the propylenediamine compound  $[\text{Copn}_2\text{CO}_3]\text{CO}_3$  by a Walden inversion method. Rotatory dispersion curves for these and for *cis*-dichloro-di-*l*-propylene-diamine cobaltic carbonate, by comparison with the curves for the analogous diethylenediamine series, lead to a determination of which of the two carbonate forms is obtained by an inversion about the central cobalt atom in the latter case. It is further suggested that the mechanism of the production of the two forms of the carbonate complex is as follows: The non-inverted form is produced through the preliminary displacement of the Cl ions in the *cis*-dichloro-di-*l*-propylenediamine cobaltic chloride by water molecules, followed by displacement of  $\text{H}_2\text{O}$  by  $\text{CO}_3$ , whilst the inverted form is produced by direct substitution of  $\text{CO}_3$  for Cl within the complex. Either form could be produced with silver carbonate alone or potassium carbonate alone by varying the experimental conditions, and the inverted form of carbonate diethylenediamine cobaltic carbonate was produced, for the first time, by using potassium carbonate.