Research Items

Origin of the Domesticated Horse

IN a survey of the evidence bearing on the evolution of the modern domesticated horse, Dr. Max Hilzheimer (*Antiquity*, 1935, June) confirms the surprising inference from the bones found in the Royal Tombs at Ur that the early Sumerians had domesticated the Asiatic dziggetai or onager. Bones since found at Tell Asmar include numerous remains of the onager, but none of animals resembling the horse. There are two, possibly three, varieties of the early horse. It is represented in palæolithic art; but it was not domesticated until neolithic, and in places, bronze age times. Its habitat was north of the central Eur-Asiatic mountain chain, except for Spain, and extended from western Europe to Mongolia. Of the two varieties, the Tarpan lies west of long. 40°, Przewalski's horse to the east. An early classification divided the domesticated horse into an oriental and an occidental breed, contrasted as in the Arab and the Clydesdale; but an early breed indigenous to Europe and native to Poland is the Konink. Notwithstanding opinion to the contrary, the original home of the Arab or oriental type is Europe, its distinguishing characters being due to climate and careful breeding. The earliest representations appear on the monuments of Assyria dating to the first half of the first millennium B.C., though it had been introduced there long before by Aryan tribes. In varying form this is the horse of the Egyptians, Hittites, Greeks, Romans and Scythians. The so-called occidental horse has been thought to be descended from the prehistoric horse, of which remains are found in the glacial deposits of Central Europe; but the break in continuity precludes this view. It first appears in dual form as the Noric horse and the horse of Persepolis of the fifth or sixth century B.C. The heavy draught horse is first seen on a tombstone at Chalon-sur-Saône in the second century B.C., and there can be little doubt that, like the Arab type, it was a product of breeding and climate which appeared first in the countries, broadly, bordering on the North Sea.

The Tongue

PROF. DAVID KATZ, formerly of Rostock University, has communicated to the Manchester Literary and Philosophical Society a summary of the results of his research on the tongue as a primitive sense organ (*Mem. Manchester Lit. and Phil. Soc.*, 1933–34). All theories of evolution, however much they may differ, agree that life must have originated and developed in water and later adapted itself to conditions on dry land and in the air. Psychologically, this is manifested in the strength of our need of water. The function of perceiving wetness seems to be restricted to one organ, the tongue. The sense of taste is a specific chemical sense; and it is a near-sense as it has to have contact with the chemical stimulus without the intervention of a medium. It cannot taste solids; they must be dissolved, this being the function of the saliva. The tongue is also remarkably sensitive to an electric current. With regard to the sensations of wetness and dryness, while all the external surface of the body is dry, the internal surfaces are moist. Normally, neither wetness nor dryness is felt in a specific manner. The only part of the body which gives a real subjective impression of wetness is the tongue, while the pharynx gives a nearly permanent impression of dryness. Together they probably form a single sensory unit which as a whole plays an important part in supervising the water economy of the body. The sensation of dryness in the pharynx controls the secretion and swallowing of the saliva. With regard to electric taste, a series of experiments has shown that an opposition of taste is created at anode and cathode of sour-salty and bitter-sweet, which can also be described as relatively bright and dark or heavy and light in analogy with the impressions of other senses, while other, tingling sensations are experienced which probably represent the generation of gas. These impressions do not depend on the metal used, and whatever the combination the threshold appears at the same intensity of current.

Ecological Conditions in Coffee Plantations

UNDER the title of "The Climate and Eco-climates of Coffee Plantations" by Mr. T. W. Kirkpatrick, entomologist, East African Research Station, Amani, Tanganyika, there has recently appeared a memoir interesting to entomologists and botanists alike. The investigations concerned were undertaken in coffee plantations in Kenya Colony. After discussing the standard climate of the district concerned, the author deals with the air temperature at a height of 1·3 metres between the rows of coffee bushes, and compares it with that in the standard screen. Similar temperatures inside a coffee bush are also recorded, together with the temperatures of the leaves of such a bush and the body temperature of an insect (*Antestia*) on the surface of a bush. Soil temperatures, humidity, precipitation, evaporation, light and other factors are dealt with in detail. The author then goes on to discuss the various factors which modify the climate of a coffee plantation. It was found that, in general, the climatic conditions in a plantation differ widely from those which obtain in a standard meteorological screen, and do not always vary in the direction which might be anticipated. It is possible, however, to deduce, with fair accuracy, the extent to which these conditions will vary from a standard. The author describes the technique employed, and the data obtained, in detail. The work is an important original contribution which should be read by all ecologists and may be obtained, price 5*s*., post paid, from the Research Station at Amani, or from the Crown Agents for the Colonies, 4 Millbank, S.W.1.

A Cure for Lime-induced Chlorosis of Fruit Trees

A yellowing of the foliage of apples and pears, induced by lime, causes a considerable amount of damage in some fruit-growing areas. Dr. T. Wallace, of the Long Ashton Research Station, has shown that this state can be remedied by the simple expedient of allowing grass to grow between the trees. This is not always desirable, however, and in a recent paper he gives the results of his experiments with a new method of treatment (*J. Pomol. and Hort. Sci.*, **13**,

No. 1, March 1935). The method is very simple. Holes are bored in the trunk with a brace and bit, a small quantity of ferrous or ferric citrate is placed within, and each hole is then closed with a cork. Treatment by this method has been quite successful, and has converted failing trees into healthy specimens. It only remains to investigate the duration of the treatment over a period of years.

Encroachment of the Sahara

IN a paper in the *Geographical Journal* of June, Prof. E. P. Stebbing directs attention to the serious threat to the West African colonies of Great Britain and France by the encroachment of the Sahara. This is due, not to climatic causes, but to the methods of agriculture pursued. Shifting cultivation is still the practice. A piece of forest is felled, the timber burnt and the ground is sown and ultimately harvested. When the weeds become too heavy, or the yield inadequate, the patch is abandoned and a new one occupied. Thus the deciduous forest on the verge of the Sudan becomes degraded, more open and drier. Eventually savannah supervenes, which in West Africa is a term applied to bush or scrub. Herds of the nomadic shepherds then occupy and further destroy it. When its fodder value has almost gone, the herdsman cuts the scrub trees to get fodder for the goat. This is the last stage in the ruination of the land and the advance of the desert. Prof. Stebbing traces the degradation of the forest with the associated ruin of the land in a broad belt in Nigeria and elsewhere, and strongly advocates the need of reserving a belt of degraded forest at least some fifteen miles in width and more than 1,300 miles in length, in which tree growth could be improved and further destruction checked. Thus the advance of the Sahara might be stopped.

Old Maps of Wales

A USEFUL account of the maps of Wales up to A.D. 1600 is published by the National Museum of Wales ("The Map of Wales". By Dr. F. J. North. 1*s*.). Apart from diagrammatic representations on the Peutinger Table, Ptolemy's maps and medieval mappae mundi and portolan charts, there was no map of value until the latter part of the sixteenth century, when there were published the Mercator map, the Lhuyd map and, most notable, the Saxton map. These are fully discussed. But of equal interest is the anonymous fourteenth century map known as the Gough map in the Bodleian library. Its date is uncertain but probably so early as 1340. The volume contains representations of parts of many of the early maps.

Atomic Weight of Terbium

THE isotopic composition and atomic weights of the rare earth elements as determined by F. W. Aston (*Proc. Roy. Soc.*, **146**, 46; 1934) are sometimes in marked discrepancy with the chemical values. In the case of terbium, the values are 158·91 (Aston) and 159·2 (international value). A volumetric determination of the atomic weight of terbium, with very pure material prepared by the fractionation of the dimethylphosphate, has been made by J. K. Marsh (*J. Chem. Soc.*, 772; 1935). The oxalate was prepared and the ratio $Tb_2O_3 : 3C_2O_3$ was determined by ignition and by titration with permanganate. The value derived for the atomic weight was 158·9. This assumes the atomic weight of carbon to be 12·00, but if it were raised to 12·01, the value for terbium would be raised only to 158·92. The new value, for which accuracy in the first place of decimals is claimed, is in very good agreement with that found by Aston, and hence both the chemical and mass-spectrograph methods indicate a value 158·9 for the atomic weight of terbium.

Structure of Cupric Compounds

E. G. COX and K. C. Webster (*J. Chem. Soc.*, 731; 1935) have examined by means of X-rays the structures of some quadricovalent compounds of bivalent copper containing acetylacetone, benzoylacetone, dipropionylmethane and 3-chloroacetylacetone as addendæ. A complete determination of crystalline structure of such compounds would be very laborious, but a consideration of space-group results, cell dimensions and optical properties shows clearly that the molecules are planar, that is, the four valencies attached to the copper lie in one plane and are not tetrahedral. Since compounds in which a planar distribution has been established appear to be in no way exceptional, it is reasonable to infer that the planar configuration is normal for four-co-ordinated compounds of bivalent copper. This result, which confirms the view expressed by Werner, is not in accord with the conclusions of Mills and Gott in 1926, who obtained a strychnine salt of cupribenzoylpyruvic acid showing a small but definite mutarotation, and inferred that the valency arrangement was tetrahedral. The case for optical activity, however, rested only on analogy with the behaviour of the brucine salt of the corresponding beryllium complex. Since there is no doubt as to the tetrahedral configuration of beryllium, it seems that this analogy is false, and that the observed results of Mills and Gott were due to some cause other than a tetrahedral copper atom. According to Pauling, a planar configuration is to be expected when *s*, *p* and *d* electrons are involved in the valency bonds. It is possible, therefore, that bivalent copper possesses a complete 3_3 sub-group of ten electrons, some being shared, instead of an incomplete group of nine, as is usually supposed. This would involve one unpaired electron in the fourth principal quantum level, giving rise to a paramagnetic moment of the same order as that which has been found.

Nova Herculis

DR. A. BEER has published (*Mon. Not. R.A.S.*, **95**, 538) a light curve of Nova Herculis from the time of its discovery (December 12, 1934) up to April 3, 1935. This is based on visual or photometric measures by numerous observers and shows well the main features of the changes observed, including the steep rise just after discovery, the rapid fluctuations with a very slow average decrease, until the final spectacular drop of more than five magnitudes within a few days. The more recent recovery from the thirteenth to the eighth magnitude is not covered by the range of dates discussed. Measures of the spectra taken at Cambridge on these dates with the 15-in. Huggins refractor over the visual region from $H\beta$ to a little beyond $H\alpha$ (7331 A.) are included. About 150 emission lines or bands have been measured in this region, for the majority of which probable identifications are given, with the origins of other possible blending lines. Laboratory intensities and multiplet classifications are given for all the origins suggested.