

Research Items

Racial Crosses in Cape Verde Islands

PROF. A. A. MENDES-CORREA, director of the Institute of Anthropology, Oporto, took advantage of the presence of some three hundred natives of the Portuguese Colonies at the Colonial Exhibition at Oporto in 1934 to make a series of observations of their anthropological characters. Among them were nineteen cross-breeds from the Cape Verde Islands, of whom all with the exception of two were more than twenty years of age. Thirteen were male and six female. As the people of these islands have been little studied, the results (*Z. Rassenkunde*, 5, 1) are of no little interest. The population of the islands is 150,553, of whom 5,794 are white, 40,154 black, and 104,605 mixed. The subjects observed had dark brown skin, dark eyes and dark brown ulotrichous hair. One woman and two men showed wavy hair. The prominence of the cheek bones was marked in the majority of men and most women. The face was very variable. Three men and one woman showed a certain obliquity of the eyes. The nose was straight in profile, and was not long. The nostrils were elliptical, almost round, with the longer axis transversal. Only four men had a stature over 1.650 m. The number is too small for the mean of 1.702 m. to have significance. The female stature varied from 1.520 to 1.680 m. There appeared to be a tendency to exceed the Portuguese mean. The skelic index also appeared to approach the negro, rather than the Portuguese. A number of measurements taken on the upper and lower extremities pointed in the same direction, the measurements being on the whole intermediate between Portuguese and negro (Guinea), but on the whole inclining towards the latter. The cephalic index of the men varied between 74.4 and 84.1, while among the women it varied from 71.4 to 84.2. As compared with Portuguese and negro, the figures show a tendency to an increase, which it is not easy to explain. Is it a result of admixture, as certain investigations on other peoples seem to show?

Beavers in Michigan

DURING the open season of 1936 (March 16-31 in Lower Peninsula and April 1-15 in Upper Peninsula) 137 bodies of beavers (*Castor canadensis michiganensis*) trapped in Michigan were examined by Seth B. Benson (*Occas. Papers Mus. Zoo. Univ. Michigan*, No. 335, June 1936). Contrary to the opinion of trappers that males largely predominate among beavers trapped in spring, it was found that the sex ratios were practically equal, 51.8 per cent females, 48.2 per cent males. Measurements and weights showed that the animals fell into two groups, a yearling class, and two-year-olds with adults. The yearlings formed 59.1 per cent of the catch, 25 per cent were two-year-olds, and the remaining 15 per cent were three-year-olds or older. None of the yearling females was pregnant, and the appearance of the uteri suggested that they do not breed. There was some indication also that some two-year-olds do not breed, or, if they do, that it is later in the season than March and April. Of the 34 adult females, 21 or 61.7 per cent contained embryos, some being almost

full term. Although the author does not allude to the fact, it seems unfortunate that the open season should coincide with a period when so many females are about to produce young.

Biology of Arctic Marine Invertebrates

IT has long been known that reproduction by direct development is a characteristic feature of bottom invertebrates in arctic seas. A recent publication by Gunnar Thorson has shown how prevalent this is ("The Larval Development, Growth, and Metabolism of Arctic Marine Bottom Invertebrates", *Meddelelser om Gronland*, 100, No. 6; 1936). A study of the bottom fauna and the plankton was made throughout the complete year in fiords in north-east Greenland. In all, about two hundred species of polychaetes, echinoderms, molluscs and crustaceans were studied. Of these, it was found that ninety-five per cent reproduced without true pelagic larval stages, the majority having very large yolky eggs. These were all purely arctic species, and the remaining five per cent, which had pelagic larval stages, were species not confined to the Arctic; these occurred in the plankton during the short period when food was most available. It is noteworthy that in north-east Greenland it was these latter species which were quantitatively commonest in the area. Examination of oxygen consumption was made, mostly on lamellibranchs, and it was found that they had a fairly high oxygen consumption compared with more southerly species at the same temperature. But at the temperatures at which they live respectively, the arctic species had a somewhat lower consumption than the southern. A comparison is made between the biology of the arctic fauna and those from other regions, and the origin of the arctic shore fauna is discussed. The paper is an important contribution to our knowledge of the biology of arctic marine animals.

Cirripedia of the Arabian Sea

A LARGE number of cirripedes are described by Mr. H. G. Stubbings (*Cirripedia. The John Murray Expedition 1933-34. Scientific Reports*, Vol. 4, No. 1. British Museum (Natural History), 1936). Two areas, the Zanzibar area and the Gulf of Aden, stand out as being specially favourable, twenty species out of forty-three collected by the expedition coming from the first, and thirteen from the second, only two species being common to both. Farther north along the South Arabian coast cirripedes were much scarcer. As is to be expected in such a deep sea collection, the genus *Scalpellum* and its subgenera predominate, fourteen species being represented. The geographical and bathymetrical distribution of *Scalpellum* is discussed, and it is shown that *S. velutinum*, which has a very wide distribution, ranges from 50 metres to 2,900 metres, but lives mainly between 600 metres and 2,000 metres. Several dwarf males were found on this species and a series of growth forms from newly metamorphosed cypris stages together with the cypris stages themselves. Dwarf males and growth stages were also found in various other forms. Among the specially interesting species are *Oxynaspis*

aurivillii overgrown with polyps of an antipatharian, and several species growing on Crustacea. Amongst the latter are three species of *Pocilasma* all growing on the crab *Echinoplax pungens* which is a favourite host, and one of these also growing on the palinurid *Puerulus angulatus* from the Gulf of Aden. Five new species are described, three *Verruca* and two *Balanus*.

Use of the Developing Egg in Virus Research

VIRUSES are unable to multiply apart from living cells, and the maintenance of a virus in the laboratory after isolation has, therefore, depended upon inoculation for the most part, though tissue-culture methods, particularly those devised by H. B. and M. C. Maitland, have proved useful, but have replaced the living animal only to a limited extent. During the last four or five years, it has been shown that the chorio-allantoic membrane of the developing hen's egg is suitable for the cultivation of most, if not all, viruses, and solves many of the difficulties connected with their study. This work has been especially pursued by Dr. F. M. Burnet, who has now written a monograph on the subject (Medical Research Council, Special Rep. Series, No. 220, London: H.M. Stationery Office, 1936. 1s. net). This gives the full technique of the method, which is comparatively simple, surveys the published work on the subject, and contains many new observations and suggestions. It is surprising how many viruses can be cultivated by the method; by serial passage, it has even been possible to adapt the virus of epidemic influenza to the egg-membrane, which seems to constitute an ideal medium for virus study, as well as being cheap and requiring a minimum of attention. The chorio-allantoic membrane also provides a tissue of simple structure in which to study the histological changes that may be caused by a virus infection.

Fire Blight of Apples and Pears

THE bacterial disease caused by *Erwinia amylovora*, and known as fire blight, has been a serious menace to apple and pear trees in America for more than half a century. Many studies of the disease and the pathogen have been made, and a recent publication by Dr. K. G. Parker (Cornell Univ. Agr. Exp. Sta. Mem. 193, August 1936, Ithaca, N.Y.) describes further investigations upon the overwintering, dissemination and control of the malady. Large cankers appear upon the branches of infected trees, or are brought to the orchard upon grafting material. The activity of the bacteria within such cankers causes an ooze of infectious material, which may be disseminated to healthy shoots by rain or by insects. Several species of flies, and ants, stand incriminated in this respect. A few bacterial organisms which are antagonistic to *E. amylovora* have been found, and some of them can inhibit the infection of blossoms when inoculated along with the pathogen. Disinfection of the overwintering cankers seems to be the obvious method of control, and solutions of cadmium sulphate have been found most suitable for this purpose.

Refrigerated Gas-Storage of Fruit

SINCE 1929, the capacity of gas stores in England has risen from negligible proportions to more than two million cubic feet in 1936—a capacity not far short of a million bushels of apples. The time is

thus opportune for the survey of the development of refrigerated gas-storage methods presented by Drs. F. Kidd and C. West (*J. Pom. and Hort. Sci.*, 14 (4), 299; 1937). The principles underlying the method are given, the considerations governing the construction of gas-tight chambers and the methods of controlling the composition of the storage atmosphere. The following advantages of gas-storage of apples over cold storage in air have been established. (1) Ripening of the fruit at a given temperature proceeds at half the rate in air, that is, the life of the fruit in store is twice as long; (2) low-temperature breakdown is avoided because temperatures are used above the limit at which this develops; (3) firmness of the fruit is preserved almost unchanged over long periods of storage; (4) change in ground colour from green to yellow is markedly retarded; (5) *Tortrix* moth larvae are quickly killed in gas storage; (6) life of the apples after removal from gas storage is remarkably long. An account is given of the normal behaviour of apples after gathering and the influence on this behaviour of temperature, oxygen and carbon dioxide concentration and volatile substances. The information so far available refers particularly to apples and pears, but there seems every possibility that similar methods may be applicable with equal success to plums, peaches, grapes and citrus fruits.

First Crossing of Antarctica

A NOTEWORTHY event in the history of Antarctic exploration was Mr. Lincoln Ellsworth's flight across Antarctica in 1935, a distance of 1,842 nautical miles, from Snow Hill Island, Graham Land, to Little America on the Ross Sea. Mr. Ellsworth's own account, accompanied by a provisional map, appears in the *Geographical Journal* of March. His aeroplane, the *Polar Star*, was large enough to carry fuel for a range of 5,000 miles if only fuel and oil were required and had a 600 h.p. engine and a possible speed of 215 miles per hour. Much of the load, however, had to consist of two months' equipment and supplies for two men. Thus when he took off, the loaded *Polar Star* weighed 7,987 lb., of which 3,614 lb. was the load of the aeroplane and 2,796 lb. (466 gallons) the load of petrol. This was just enough fuel to carry the *Polar Star* across, with four landings on the way. At the final landing, sixteen miles from Little America on the Bay of Whales, the fuel was completely exhausted. Several features of importance were noticed on the way. Stefansson Strait of Wilkins appears to be not more than three miles wide and might even be a fjord and not a strait. This seems to be in accordance with Mr. Rymill's recent discoveries farther west. Eternity Range, south of the strait, showed bold rugged peaks rising to 12,000 ft., in contrast with the lower, flatter summits of Graham Land. Farther on, this range gave way to scattered nunataks and then, in about lat. 78° S., long. 85° W., was sighted the lofty Sentinel Range. Thereafter stretched an apparently unbroken ice-covered plateau at an elevation of about 6,000 ft. to Marie Byrd and Edward Lands.

Sea Breezes

At a meeting of the Royal Meteorological Society held on February 17, Dr. R. C. Sutcliffe gave the results of an analysis of ten years observations of the wind up to a height of 5,500 feet, made with the aid of pilot balloons at Felixstowe, with the object of studying the behaviour of the sea breeze at various

levels. In order to eliminate days unfavourable for a full development of the sea breeze, those days on which the duration of sunshine shown by a Campbell-Stokes sunshine recorder was less than 70 per cent of the possible duration for the time of year were omitted. The mean direction of the coast at Felixstowe, it may be noted, is from south-west to north-east, a south-east wind being, therefore, an on-shore wind. It was found that when a sea breeze replaces a land breeze as the day advances towards the hottest time, the vector change of speed at right angles to the coast is about 15 m.p.h. on an average up to a height of 500 ft., but is less higher up, becoming very small above about 1,500 ft. Although the average depth of appreciable sea breeze is therefore only about 1,500 ft. at Felixstowe, no definite evidence of a compensating return current was found higher up. The component along the coast behaved so that there was a tendency towards a geostrophic wind in the afternoon, the land being on the left, as though it were a region of low pressure; this coastal component averaged about 5 m.p.h. near the surface, except in the case of northerly winds. With a general inshore wind not due to sea breeze, there was very little increase in the landward component towards the hottest time of the day, but there was a backing of the direction.

Air Temperature during Total Solar Eclipses

IN *Mon. Not. Roy. Astro. Soc.*, 97, 2 (Dec. 1936), Dr. John L. Haughton has a paper in which he describes the apparatus used by him for determining the fall in temperature during the total solar eclipse of June 19, 1936. The instrument responded very rapidly to change of temperature, and it was possible to read to about 0.1°C . by means of the millivoltmeter (1 mv. = 2.1°C .). The maximum fall from a curve indicating what the temperature might have been if there had been no eclipse was only 1.5°C ., and Dr. Haughton thinks that this small fall can be accounted for by the low altitude of the sun and the thermostating effect of the large mass of water. (The observation was taken on board the S.S. *Strathaird*.) When we hear of 'the great fall in temperature' in the case of some eclipses, this is, Dr. Haughton thinks, a fall in radiation temperature, not in air temperature. Comparisons are made between the fall in temperature during this eclipse and the fall in the case of the eclipse of 1927 and also of 1932; but owing to the different conditions, accurate comparisons are impossible, so that the table showing the results has little value.

Composition of the Atmosphere

THE constancy of the percentages of carbon dioxide and oxygen in uncontaminated atmospheric air was established by Benedict in 1912. T. M. Carpenter has now described (*J. Amer. Chem. Soc.*, 59, 358; 1937) several hundred analyses of air made in the period 1930-36 in New Hampshire, Baltimore and Boston. The apparatus was capable of giving burette readings to 0.001 per cent. The grand average of all three series gave 0.031 per cent for carbon dioxide and 20.939 per cent for oxygen. In spite of widely different local conditions of the three laboratories, there was no evidence that variations in season or proximity of large consumers of fuel caused any measurable differences in the carbon dioxide and oxygen content in the atmospheric air. The Boston laboratory is situated near a large power

station and that in New Hampshire near a heavily wooded locality. The deviations from constant values found were very small, the percentage of oxygen having a constancy beyond the accuracy of many atomic weight determinations.

Oxidation of Coal

B. JUETTNER, R. C. Smith and H. C. Howard (*J. Amer. Chem. Soc.*, 59, 236; 1937) have examined the oxidation with alkaline permanganate of a Pittsburg bituminous coal and of a 500° coke made from it. It is shown that 90-95 per cent of the carbon can be recovered in the form of water-soluble, non-colloidal acids, of which aromatic acids correspond with 30 and 35 per cent, respectively, of the carbon in the coal and coke. Good recoveries of oxalic and aromatic acids can be obtained by direct electrolytic decomposition, in a three-compartment cell, of the potassium salts resulting from the oxidation. Oxalic acid and aromatic acids recovered in this way were 88 and 98 gm. per 100 gm. of coal and coke, respectively. It is pointed out that the failure to recover hydrocarbons more complex than diphenyl by decarboxylation does not necessarily preclude the possibility of the presence of acids with condensed aromatic nuclei containing carboxyl oxygen, since drastic alkaline decomposition is known to split the nuclei of such aromatic acids. R. C. Smith and H. C. Howard (*ibid.*, 234) have also shown that the products of pyrolyzing cellulose at temperatures up to 400° contain benzene and diphenyl.

Refraction and Diffraction of Ultra-Short Waves

IT is probable that in the near future, ultra-short waves (those below ten metres in length) will be extensively used for television, for short-distance point-to-point communications and for communicating from or between aircraft. Any information, therefore, concerning the physical properties of these waves is of great practical importance. In the *Journal of the Institution of Electrical Engineers* of March, T. L. Eckersley, taking up the theory which has been developed by several eminent mathematicians, shows how it can be explained graphically in a method helpful to radio engineers. Hitherto it has been assumed that the earth has infinite resistivity, and formulæ for the propagation of spherical waves round it have been found. Eckersley has extended the solution to the case of a spherical earth of finite resistivity and has deduced results which, at least partially, are borne out by experiment. The problem is not one that can be solved by geometrical optics but requires the full wave theory for its solution. The author considers that diffraction plays the leading part in controlling short wave propagation, but he has found evidence of variation of signal intensity at extreme distances, which he considers can only be caused by the gradient of the refractive index of the air near the surface of the ground. He considers that the hypothesis that the variations are due to reflections from the ionosphere is a very doubtful one. Water vapour has a high refractive index and the effect of a small percentage present is very pronounced. He shows that there is a gain in the signal strength with height in the regions beyond the visible range. Several observers in America using either aeroplanes or autogyros have observed this increase in the signal strength with height, and their measurements are in fair agreement with theory.