

Research Items.

ARROW-RELEASE.—Mr. A. L. Kroeber has worked over the material relating to methods of arrow-release, with special reference to the distribution of the various types and its bearing upon the problems of diffusion. His results are published as No. 4 of vol. 23 of the *University of California Publications in American Archaeology and Ethnology*. Five methods of release are recognised: two, the primary and secondary, depend upon a direct hold on the arrow; the tertiary draws on the string holding the arrow between thumb and index; the Mediterranean draws on the string with the end of the fingers at right angles, holding the arrow between index and middle fingers; and the Mongolian employs a thumb, usually with a ring, to pull the string, this release being closely associated with the composite bow of horn, sinew, and wood. The distribution of the Mongolian release is compact and Asiatic, with an extra-Asiatic occurrence among the Yahi in northern California, here attributed to independent invention. The Mediterranean occurs in three areas—Europe to south-east Asia, with the earliest record in Twelfth Dynasty Egypt, Eskimo (Siberia, Alaska, and Baffinland), and in south California, Arizona, and Sonora. These are construed as separate origins. The distribution of the tertiary release is irregular, occurring in central North America, Central America, and the Congo, with eight cases between India and Melanesia. The secondary is the least wide-spread, being reported, apart from doubtful cases, only from North America. The primary is the most irregular, and appears to be due to the persistence of originally 'primitive' or simple methods, and occurs in a distribution marginal to the tertiary release. The general conclusion is that there is a seemingly limited number of normal growth or spread distributions and several probabilities of independent origins.

ORIGIN OF THE CRIMEAN FLORA.—The Russian botanist Wulf has published recently (in the *Mem. Crimean Society of Natural History*, vol. 9, 1926) an interesting paper in which the problem of the origin of the flora of the Crimea is discussed on the basis of some new botanical evidence as well as of the geological data. The main conclusion is that the Crimea represents a fragment of a mountainous 'Pontic continent,' which was a continuation of the northern Asia Minor and existed to the end of the Pliocene, if not in the Quaternary period. The original flora of the Crimea was, accordingly, that of the eastern Mediterranean type, and relics of that flora are still numerous in the Crimea. During its history the Pontic continent had been connected temporarily with other neighbouring lands—with southern Russia, with Dobrudsha, with the region of the Azov sea. At the end of the Tertiary and early in the Quaternary Age the eastern regions of the Mediterranean countries sunk, the Black Sea depression was formed, and the Crimea became a peninsula. During the Ice Age the flora of the Crimea became considerably poorer. Endemic element in the Crimean flora is of two kinds: ancient relics, only 13 in number (*Cerastium Biebersteinii*, *Eremurus tauricus*, *Centaurea comperiana*, and others), and a large number of young endemic forms (sub-species), which testify to the insular character of the flora. Population of the Crimea by plants, as an analysis of the flora shows, occurred from various sources: from Asia Minor, from western Transcaucasia, from the Balkanian peninsula, and from southern Russia. Prof. L. Berg, who is a well-known Russian ichthyologist, in giving a review of Wulf's paper in *Priroda* (1927, No. 3), says that the

evidence offered by the study of the fresh-water fishes of Crimea does not contradict the suggestion of the former existence of the Pontic continent; this fauna is somewhat poor, including about fifteen species altogether, and the only endemic form is *Barbus tauricus*, which is merely a geographical sub-species of *B. escherichi* distributed in the rivers of Asia Minor flowing into Black Sea.

GRAPHIC COMPARISON OF RELATIVE VARIABILITY.—Prof. Raymond Pearl has devised a simple graphic method for comparing the relative variability of unlike characters belonging to the same or different populations (*Science*, Mar. 11, 1927). The coefficient of variation does not give a clear picture of the scatter in a distribution; but the variation of a population in such diverse features as age, stature, body weight and relative cell volume of the blood can be compared by making two simple transformations of the data: (a) expressing the frequency of each class unit as a percentage of the mean value for each character, and (b) expressing the frequencies as so much per one per cent. of the mean of each character. The values so obtained can be directly plotted on co-ordinate paper and will give superimposed graphs which are directly comparable with each other in all their details. In this way the variability in milk yield of cows may be compared with, for example, the egg production of fowls, and the populations compared may differ widely in number of individuals.

GENETICS AT THE CARNEGIE INSTITUTION OF WASHINGTON.—In the Department of Genetics of the Carnegie Institution of Washington, which has now been in existence twenty-three years, Dr. Banta has now bred parthenogenetic Cladocera for 650 generations, obtaining mutations in reactivity to light, 'excavated head' and intersexes, which show Mendelian behaviour in crossing (Year-Book, 1925-26). It is believed that evidence of the compound nature of the gene is obtained from the multiple allelomorphism in *Drosophila* and also from *Delphinium*. In the fly *Sciara*, Metz finds that in spermatogenesis the chromosomes do not pair, but all the maternal chromosomes pass into the sperm while their paternal homologues are cast off. Consequently the sperm fails to transmit paternal traits. Some genetic confirmation of this has been obtained. In the continuation of genetical and cytological studies of *Datura*, evidence is obtained that non-homologous chromosomes may show mutual attraction, and that pieces of such chromosomes may unite to form whole chromosomes which give aberrant genetic results. In pigeon breeding, strains with high and low thyroid content have been produced, and the action of endocrine glands as a complication in inheritance is emphasised.

LAMSIKTE IN CATTLE IN SOUTH AFRICA.—This disease is characterised by weakness and paralysis, chiefly of the locomotor system, and causes considerable mortality and loss. Sir Arnold Theiler and his collaborators have now proved that the disease is caused by the ingestion of a bacterial poison or toxin elaborated by an organism closely allied to the *Bacillus botulinus* which causes the form of food poisoning in man known as botulism; lamsiekte may therefore be termed "parabotulism" (Union of S. Africa: Dep. of Agriculture, 11th and 12th Reports of the Director of Vet. Education and Research. Pt. 2. By A. Theiler, with P. R. Viljoen, H. H. Green, P. J. du Toit, H. Meier, and E. M. Robinson. Pretoria: Gov. Printing and Stationery Office, 1927). The manner in which the cattle become

poisoned is of considerable interest. The veld soil and herbage are very poor in phosphates and it does not pay to apply phosphatic manures. Consequently, the cattle suffer from phosphorus deficiency, particularly in certain districts. To supplement this deficiency the animals develop perverted appetites, which impel them to gnaw or eat substances foreign to their normal diet, such as bones, carcasses, or the offal thereof, derived from animals or game which have died on the veld. Now the toxin-producing micro-organism (*B. paratuberculosis*) inhabits the soil, may infect the carcass, and may there produce its toxin. A beast ingesting some of the toxin-impregnated offal is poisoned and thus develops the disease lamsiekte. It had long been recognised that phosphorus deficiency was in some way connected with the development of lamsiekte, and that a ration of bone-meal added to the diet would to a large extent prevent it, but the connexion between the two was unknown until explained by the present researches. Bone-meal supplies the phosphorus lacking, so that the animals do not turn to the toxin-impregnated offal to supply their needs, and are therefore not poisoned, *i.e.* do not contract lamsiekte.

FAUNA OF KARACHI.—In December 1920 a party of advanced students of the University of the Panjab, under the direction of Prof. G. Matthai, made a collecting excursion to Karachi, when a number of specimens of the polychaet genus *Eurythoe* were obtained. In October 1922, S. S. Bindra made a further collection in the same area, and his report, based on the examination of nearly five hundred specimens of the genus, is published in vol. I, pp. 1-18, of the Memoirs of the Department of Zoology, Panjab University, 1927. A key to the twenty-three known species of *Eurythoe* is given, and careful descriptions are provided of the five species represented in the collection from Karachi; two of these species are described as new. The memoir is illustrated by two excellent colotype plates and by text figures. Prof. Matthai states that this is the first of a series of papers on the fauna of Karachi which is to be published.

FOSSIL DECAPOD CRUSTACEA.—In a memoir on "The Fossil Stalk-eyed Crustacea of the Pacific slope of North America" (*Bull. U.S. Nat. Mus.*, 138, 1926), Miss M. J. Rathbun gives an account of all the species of decapod Crustacea which have been found fossil in that region and describes a large number of new forms. The age of the deposits ranges from Upper Cretaceous to Pleistocene. By far the larger number of species belong to the Brachyura. The *Astacura* and *Palinura* have only a small number of representatives; one Pliocene species of the former group is referred to the genus *Astacus*. Only two species of Stomatopoda are recorded. Of the 11 genera of decapods from the Cretaceous of the Pacific slope, 10 have representatives in Europe; of the 15 from the Eocene, 11 are known in Europe; but in the Oligocene the proportion of European forms is smaller.

ATOMIC PHYSICS.—The issue of the *Proceedings of the Physical Society* for April 15 contains the presidential address of Prof. O. W. Richardson on the present state of atomic physics. He points out that although the quantum theory and the nuclear atom have admitted of great advances into the physics of atoms, they have led to difficulties which it has not been possible to overcome. Of these, the necessity for using half quanta to explain band spectra, the lengthening of the mean free path of an electron in an inert gas when the speed is reduced, and the excess of the calculated over the observed ionising potentials for the simpler gases may be mentioned. They have

led to a revolt against the views which three or four years ago held the field, and Heisenberg two years ago discarded the atomic model and dealt with the radiations only. These may be treated as the terms of a matrix and are subject to the laws of matrix algebra. Another line has been taken by de Broglie in his wave mechanics, and Schrödinger has followed it with marked success. The electron is taken as a train of waves with a group and a phase velocity, and this leads to explanations of a number of the difficulties of previous theories, although it is not free from difficulties of its own.

DIRECTION CHANGES AND FADING IN RADIO SIGNALS.—Many observations have recently been made on the phenomena of the change of direction of radio waves and on fading, that is, the fluctuation of their intensity. The results seem to depend on several factors and there is no general agreement as to which are the most important. H. J. Reich, in the *Journal of the Franklin Institute* for April, describes careful tests made to determine to what extent change of direction of the waves is connected with fading. He mentions incidentally that on one evening it was impossible to find at his observing station directional minima from any sending station. The experimenters concluded that something had gone wrong with their apparatus and gave up testing. Later on they discovered that on that evening there had been a brilliant display of the aurora borealis. It would be interesting to know why this should result in a complete absence of directional minima. The author concludes from his observations that rapid and pronounced fading is usually accompanied by rapid direction changes of large amplitude. There seems, however, to be no relation as to the exact time at which the changes occur in the two phenomena. The two phenomena often begin and end almost simultaneously. No relation could be detected in the direction changes of the signals between two different stations. There is generally a pronounced deflexion of fairly long duration shortly after sunset and shortly before sunrise. The direction of the deflexion in this case does not always verify the theory that refraction takes place at the border surface between day and night. Further experimental work seems to be desirable in order to clear up the seeming discrepancies between the results of various experimenters.

MATHEMATICAL MODELS.—Messrs. G. Cussons, Ltd., of the Technical Works, Manchester, and Thanet House, 231 Strand, W.C.2, have issued an interesting list of mathematical models, according to the collection of Messrs. Weiner and Treutlein. H. Weiner's models are mostly formed of threads, wires, and adjustable rods. This representation visualises the regular polyhedra to great advantage, one typical model showing the five cubes whose vertices are corners of a regular dodecahedron. Surfaces of the second order are illustrated by wire models showing their principal sections, generating lines, and circular sections. More elaborate systems of wires illustrate surfaces of revolution, screw surfaces, and twisted curves, including their singularities. Weiner's list also includes a variety of link polyhedra to illustrate the bending of surfaces and developables, together with a few ruled surfaces of higher order. P. Treutlein's models explain systems of measures, weight, and coinage. The simpler ones, illustrating theorems about congruent figures and areas, are followed by various prisms, cylinders, sections of cylinders and cones, and quadric surfaces. A student or teacher of solid geometry will find that such models as these help him greatly in visualising the figures with which he deals.