

Research Items.

The Earliest Bantu.—The problems of the Bantu languages and the light they throw upon the earliest culture of the Bantu-speaking peoples are discussed by Dr. N. J. v. Warme in *Africa*, vol. 3, No. 1. The Bantu languages constitute a group of exceptional uniformity both in grammar and vocabulary, which indicates that they are derived from one clearly distinct form of speech. From the comparative study of living Bantu dialects, philologists have reconstructed archaic or Ur-Bantu. From this may be deduced a knowledge of the ideas and the culture, and perhaps the place of origin of the ancient Bantu. The roots now accepted as belonging to the Ur-Bantu tongue number nearly a thousand. These indicate that the original home of the early Bantu was by a lake (root *yangja*; for example, Nyassa, Nyanza). Neither the names of animals nor plants are helpful, as they are too widely distributed throughout the whole continent; but the roots for the names of animals exclusively African are widely spread, so that the Ur-Bantu were familiar with them from an early date. If, therefore, they came from Asia, it must have been before their language began to split up, and the infancy of Ur-Bantu may safely be laid in Africa. As regards the nature of their culture, the root *Yombe*, meaning cattle, is of wide distribution, and cattle must therefore have been known long ago. But in South Africa the root for cattle, *Komo*, is related to the Hottentot *goma-b, kumamb*. Further, it is only in the South African languages that the root for sheep occurs to any extent, suggesting that the Bantu obtained their sheep from the Hottentot. The widely distributed terms for breeding or rearing apply only to cattle. On the other hand, the Bantu were not cattle breeders simply, and a similar examination of the roots indicates that agriculture also played a part in the economic life of the people. The grain with which they have been longest acquainted is millet, and their agricultural implement the hoe. The evidence would also point to the fundamental religious conception as being taboo. Although *tila*, 'to forge iron', is common, there is no term for iron, and the word *tumbi* in use in South Africa also means cowrie, so that apparently iron was not known to the early Bantu, and when introduced was used through barter, and primarily served the purpose of currency and ornament only.

Vocational Guidance in Schools.—In the *Journal of the National Institute of Industrial Psychology*, vol. 5, No. 1, there is a suggested scheme for the organisation of vocational guidance in schools. It is no longer necessary to defend vocational guidance as such; its value in numbers of cases has been well established. There is, however, the very practical problem of providing assistance in the selection of a career for large numbers. The article suggests that in every school there should be one person whose recognised duties should include the vocational guidance of the children. He should work in consultation with his colleagues, the parents, and the school medical officers. As, however, no one person could obtain all the necessary information about all possible careers and industrial facilities, his work should be supplemented by that of a visiting vocational adviser, who should be responsible for the vocational guidance work in all the schools in his district. He should be the originator of new lines of inquiry, of experimentation with new tests. The suggestions put forward in the article are worthy of serious consideration.

Inheritance of Natural Immunity.—The literature on natural immunity in animals and its inheritance has been summarised by Mr. A. W. Kozelka (*Jour. of Heredity*, vol. 20, No. 11), who points out that immunity to a particular disease may be characteristic of a species, a race, or an individual. Many curious cases of specific and racial immunity are cited. The immunity of the frog to anthrax is at least partly due to the phagocytic activity of its leucocytes, while the blood serum of animals often has a bactericidal effect. The alligator is immune to tetanus because of a natural antitoxin in its blood. Such human diseases as diphtheria, typhoid, scarlet fever, measles, and yellow fever are not found in animals. Larvae of the rhinoceros beetle were found by Metchnikoff to be susceptible to cholera but immune to anthrax and diphtheria, while crickets are readily susceptible to anthrax. Among related species, *Anopheles maculipennis* carries malaria, while *A. punctipennis* is immune. Negroes are relatively immune to yellow fever, and Japanese to scarlet fever. Negroes are very susceptible, and urban Russians, Poles, and Jews much more resistant to tuberculosis. Measles is a fatal disease among various native races. Such racial differences have probably resulted from natural selection through long exposure to the disease. Among domestic animals, the Algerian sheep is the only breed not susceptible to anthrax. Zebu cattle are apparently unaffected by foot-and-mouth disease, anthrax, and Texas fever, and the immunity is transmitted in some degree in hybrids with ordinary cattle. The Japanese waltzing mice are susceptible to implanted tumours, while the degree of resistance in house mice varies greatly in different localities. Many rats are immune to plague. Some 50 per cent of human beings and 30 per cent of horses are naturally immune to diphtheria. By selection, strains of mice resistant to mouse typhoid can be produced, or of guinea-pigs resistant to tuberculosis. In many of these cases several Mendelian inheritance factors appear to be involved.

Fishes of the North Atlantic.—The International Council for the Exploration of the Sea, at the Copenhagen meeting in June 1928, decided to undertake the publication of an illustrated ichthyological fauna of the North Atlantic. Parts 1 and 2 of this work have now appeared ("Faune ichthyologique de l'Atlantique Nord". Conseil Permanent International pour l'Exploration de la Mer (Publiée sous la direction de M. le Professeur Joubin). N.p.: n.d.). It is published in the form of loose cards made up in sets of 24. Each set or part is enclosed in a folder, and the entire work is expected to run to about 15 parts. One card is devoted to each species and contains, in addition to one or more illustrations, a clear and precise description of the fish, its geographical distribution, synonymy, and a short bibliography. The legend is written—in English, German, or French—by specialists on the group or family concerned, and each card is signed by the author. Some of the illustrations are original, others are reproduced from standard works. It seems unfortunate, however, that more original illustrations are not being produced, especially when some of those copied from elsewhere could be replaced by better illustrations.

Mammals of Buru, Moluccas.—For the first time a list of the mammals of Buru has been published, and it reveals a fauna of unusual interest (Dr. K. W.

Dammerman in *Treubia*, Buitenzorg, vol. 7, Suppl., December 1929). Of the 27 species recorded, 16 are bats, and of the four rats and mice, three are recorded for the first time from the island. The most interesting species are undoubtedly the Moluccan deer (*Cervus hippelaphus moluccensis*) and the Babirussa. Buru is the type locality of the former, although the race seems now to be very rare there, and may have been imported in former days. Dr. Dammerman regards Buru as the type locality also of the Babirussa, for although Linnaeus described the species as from Borneo, the older Dutch authors do not mention its presence there, and the Dutch name Boeroe for Buru may have led to confusion. It is curious that, in spite of the frequency with which skulls of this species may be found in museums, the skin of the beast itself is so rare. Even the museum at Buitenzorg has only an old and badly stuffed specimen from Celebes and a recent damaged skin from Buru. The unexpected and localised distribution of the species on the island and the fact that it has no native name suggests that at one time it may have been introduced from Celebes, for Quoy and Gaimard stated that in former times the rajahs there kept and bred the babirussa in order to make presents of it. The shortness of the skull and less straight profile of the Buru race may be, as in domestic pigs, indications of domestication.

A New Japanese Oyster.—Dr. Haruo Seki has discovered a new species of *Ostrea* from Japan which he has named *Ostrea futamiensis* ("Description of a New Species of Oyster from Japan", *Proc. Imp. Acad. Sci.*, Tokyo, vol. 5, No. 10, 1929). This oyster is to be found with *Ostrea denselamellosa*, and has hitherto been regarded as a dwarf form of that species. The new oyster, bearing the Japanese name of *Kuro-himegaki*, has a much larger egg than *O. denselamellosa*, although the shell in the adult is much smaller. The spat is either uniformly black or striped with yellow. The developmental stages take place within the mantle cavity until the free-swimming straight-hinge larval stage is reached, the larvae when freed being found near the shore in the deeper water layers. So far as has been observed, each individual spawns twice or thrice at intervals of from ten to twenty days during the spawning season, which lasts from the middle of June to the end of September.

Taxonomy of Bryophyta.—In "Honduran Mosses collected by Paul C. Standley" (Field Museum of Natural History, Chicago; Pub. 267 Bot. Series, vol. 4, No. 9, 1929), Edwin B. Bartram describes 178 mosses, representing 79 species and including four new to science, *Campylopus hondurensis*, *Bryum Standleyi*, *Bryum bursiforme*, and *Rhynchostegium patulum*, which are figured and described. The data are too meagre for a discussion of geographic distribution, but Mr. Bartram considers the evidence points to affinity with Mexico and the Antilles rather than with the types of Costa Rica and Panama. It is suggested that *Isotergium scalpellifolium* (C.M.) Broth. should be restored to *Microthamnium*.

Hybridism in the Forests of New Zealand.—In no country is the knowledge of hybridism in the native flora so advanced or the recognition of its all-important bearing upon floristic and ecological botany so fully appreciated as in New Zealand, where Dr. Cockayne's researches have done so much towards a proper understanding of its taxonomic significance. In a recent paper (*Acta Forestalia Fennica*, 34, 1929), he gives details concerning the forest and semi-forest hybrids, more than a hundred groups of which have been recognised. Cogent reasons are advanced for accepting

the hybrids as valid, and in several cases hybrids have been synthesised which match those occurring in the field. With one exception, so far as is known, all the hybrids are fertile, and the constant crossing and segregation which takes place results in the hybrid groups all occurring as big polymorphic swarms of individuals which have previously been either aggregated into so-called 'variable' species, or segregated into inconstant varieties. The rôle of the hybrids in the forest is discussed with reference to the number and relative abundance in the community of the hybrid groups and the life-forms of the hybrid individuals which are present.

Development of the Inflorescence in Cereals.—Very valuable data on this subject are provided by Yakichi Noguchi for Japanese cereals in a paper in the *Journal of the College of Agriculture*, University of Tokyo, 10, 247-303; 1929. Detailed measurements of the inflorescences at various stages are supplied, together with details of morphological development for six spring-sown and four winter-sown cereal types under Japanese conditions. A study of the rice plant's development under various conditions of cultivation shows that the developmental characteristics vary very little, which adds force to the general conclusion that spring and winter-sown types show very different types of development. In all the cereals the initials of the reproductive organs are already to be detected in the embryo in the mature grain. In the spring-sown types, a very slow growth of the panicle initial occurs for the first 40-50 days, and during this time the morphological changes in the growing point are negligible. Growth and differentiation then start suddenly and proceed very rapidly until the panicle emerges from the bud. In the winter-sown types, on the contrary, shortly after sowing, floral parts begin to differentiate in the panicle initial, although growth is slow for the first 120-150 days. Then rapid growth begins and proceeds for some 65 days longer, when the panicle emerges from the bud. No correlation was found between the vigour and period of vegetative development, and the processes of floral differentiation and development; on the other hand, a large grain showed correlation with a large embryo and a large embryo with the degree of differentiation of the floral rudiments within it. On the basis of a comparison of the growth and development of their floral organs, Noguchi would put rice, sorghum, panicum, and setaria into one group; wheat, rye, barley, and oats in another, with maize yet another distinct type. The data supplied in this paper are very full and valuable, and will well repay close study.

Salinity Investigations in the South African Seas.—Mr. Marchand has shown (*Fisheries and Marine Biological Survey*. Report No. 6. For the Year 1927-28. Special Report No. 4. Pp. 1-21) that water samples can be analysed within three months without any appreciable inaccuracy in the results, and confirms Dr. Gilchrist's statement that "the Mozambique Current, which has been subjected to the evaporation of the equatorial regions, contains a greater percentage of salt than the Antarctic waters" which is known as the Benguela Current on the west coast. This difference in salinity has not been observed to have a direct effect on life in South African seas, but the existence of waters of different temperature and salinity side by side forms an effective barrier to some animals.

Echo Sounding and Depths.—In an article on echo sounding in the *Hydrographic Review*, vol. 6, No. 2, Dr. H. Maurer raises a practical issue of much import-

ance. In order to calculate the true echo distance, obtained by a sonic sounder, the mean velocity of sound between the ship and the bottom must be known. The velocity varies with temperature, salinity, and pressure. Tables for conversion of echo distances to depths are issued by the Admiralty (H. D. 282), and comparisons made by the German vessel *Meteor* in recent work in the South Atlantic showed that the use of these tables gives fairly accurate results in cases where the depths was ascertained by both echo and wire. Yet out of 245 comparisons of depths of more than 2000 metres, 36 gave a difference exceeding 100 metres and the maximum difference was 650 metres. The echo gives, of course, the distance to the nearest point on the bottom, and not necessarily the vertical depth. Since depths are frequently important in finding position, Dr. Maurer suggests that the echo-distances should be entered on the chart. The crude echo distances, converted on a single constant velocity, are the most useful to the seaman and also for scientific purposes since it is then possible to convert them by the latest data available. Results of echo-sounding given in depths without any indication of the velocity on which the depths are based or of attempts to rectify oblique distances are practically useless and may be misleading.

A New Lamp.—The February issue of the *General Electric Review* contains a description of a new form of electric lamp, in which an arc and filament are operated together. The arc passes between terminals of tungsten in an atmosphere of mercury vapour and pure argon, and the filament, a V-shaped spiral of tungsten, is connected internally in the same bulb between the electrodes of the arc. In the lamp for which details are given, about two-thirds of the light emitted comes from the tungsten electrodes, and one-quarter from the arc, the remainder being presumably from the filament. The colour temperature of the light is greater than 3500° absolute. The tube passes a current of about 30 amperes at 11 volts, and is self-starting. Ultra-violet light of physiological value has been conserved by making the bulb of a special iron-free glass, which is partially transparent down to a wave-length of 2800 Å.

The Charge of an Electron.—Prof. A. S. Eddington's derivation of the amended number 137 for the atomic constant $hc/2\pi e^2$ is given in a paper entitled : "The Interaction of Electric Charges" in the March number of the *Proceedings of the Royal Society*. As he indicated in his letter to NATURE on this problem (Nov. 30, 1929, p. 840), the mistake in his earlier theory (see NATURE, Jan. 26, p. 138, and Feb. 2, p. 174, 1929) consisted not so much in overlooking that degree of freedom of a pair of electrons which has no counterpart in the theory of a single electron—alteration of the proper distance between the two—as in not recognising its distinctness from the others. Whether or not the best *experimental* value of the constant is 137 is still perhaps an open question. In addition, by making definite assumptions as to the physical significance of certain transformations and results of quantum theory, Prof. Eddington has traced down the distinction between space and time to properties of matrices ; the matrix theory predicts that one dimension of the world will be related to the other three by Lorentz transformations instead of by rotations. Still another tentative line of argument points to an origin of the loss of mass which occurs in such cases as the formation of the nuclei of atoms, in the loss of a degree of freedom when charges link up to form a *perfectly rigid* system. Prof. Eddington's aim in this paper has been to substitute a more satis-

factory geometrical basis for the appeals to the analogies of classical dynamics which occurred in his earlier theory, but he expresses the opinion that finality has yet to be attained.

Iridescent Colours in Nature.—The discourse on iridescent colours given by Lord Rayleigh at the recent exhibition of the Physical and Optical Societies at the Imperial College of Science has been published in full—apart from the illustrations—in the February number of the *Journal of Scientific Instruments*. The objects dealt with were chiefly butterfly wings, beetles, and the eye of a peacock feather. That the colours of butterflies are partly due to absorption and partly due to interference is well established, but the origin of the colours of an iridescent beetle has been a matter of controversy. The facts presented by Lord Rayleigh seem to establish that they are due to interference in a laminated structure, and not to surface reflection, for quite apart from the variation of the colour with the angle at which the beetle is viewed, the characteristics of the banded spectrum of light transmitted by a specimen are those of an interference spectrum. All the observations mentioned by Lord Rayleigh are not yet completely explained, however ; in particular, the bleaching of what are apparently interference colours by exposure to ultra-violet light, or even to sunlight, calls for further investigation, and especially the complicated behaviour of the peacock's feather, in which, under such treatment, certain zones have their reflecting power for red light increased.

Origin of Protoactinium.—The January number of the *Journal of the American Chemical Society* contains an important paper by J. E. Wildish on the separation of tantalum from different uranium ores, this element being the nearest homologue of protoactinium. The uranium and protoactinium contents of five uranium ores from widely separated localities were determined and the atom for atom relation between uranium and protoactinium computed in each case. The results show that the ratio in different ores is very different, and consequently lend support to the hypothesis that the actinium series originates from some other source than uranium-II.

Ignition of Hydrocarbons in Oxygen.—It is now generally recognised that paraffin hydrocarbons react readily with oxygen at comparatively low temperatures. In the January number of the *Journal of the Chemical Society*, J. S. Lewis describes some experiments in which mixtures of hydrocarbon vapour and oxygen were heated in glass bulbs until explosion occurred. It was found that in dilute mixtures explosion could not be produced, but extensive oxidation had occurred at about 235°, and the rate of heating was also important. The minimum percentage for ignition increased with the instability of the hydrocarbon towards oxygen. With rich mixtures the explosion was not so violent : the violence increased with reduction in hydrocarbon content until a maximum was reached when the ratio approaches that for complete combustion. A more rapid rate of heating tends to raise the ignition temperature, a result not found with olefines. In presence of powdered charcoal the ignition temperature of paraffin is raised, that of amyrene considerably lowered. In presence of lead tetraethyl the ignition temperature was raised, sometimes as much as 40°. It is concluded that the explosion of hydrocarbons takes place in two stages : the explosion of the products of autoxidation (peroxides or chain reactions) followed by the combustion of the products in the excess of oxygen to oxides of carbon and water.