

Research Items

Head-Hunters of New Guinea. Dr. H. H. Sharp describes in *Man* of July the Gumakari people of the Suki Creek, New Guinea, in whose lives head-hunting plays an important part, and is in fact a religion. The Gumakari people inhabit villages in the lagoons and marshes drained by the creek to which the name Suki, a foreign name, has been applied. Dancing, head-hunting and hunting are their principal occupations. The chieftainship is hereditary, and exists in a virile form. The chief controls the cultural life of the people, and his power is remarkable. When the people go head-hunting they are accompanied by the women, who go to make sago and keep the party in food; but in a recent raid the women are said to have killed some Weredai who escaped into the water. The reason for a recent raid against the Weredai is said to have been that there were five widows in the village who could not have sexual intercourse or eat the flesh of kangaroos until heads had been taken. Since the raid the women have joined certain men of the tribe, but these were not men who were necessarily the 'big men' of the raid. The Gumakari are said normally to have taken their heads from a tribe of nomads, who live in a tract of bamboo-forest land on the banks of the Fly River. When a head is taken the victim is killed, if possible, by blows on the body; in some instances, the head is removed while the victim is alive. Old experienced hunters never break a head. The heads are carried back in a natural state, and after a ceremonial dance are preserved, the skin being retained over the skull. After two or three years, when they cease to be in good condition, they are buried without ceremony.

Studies on Diphtheria and Diphtheria Immunity. A remarkable epidemiological study, extending over ten years, of the occurrence of diphtheria and of diphtheria bacilli carriers, and of the development of immunity to diphtheria in a relatively isolated community with a population of approximately 1,000 susceptible individuals, is brought to a close by the issue of a report by Surg.-Capt. Dudley and May and Surg.-Com. O'Flynn ("Active Immunization against Diphtheria". *Spec. Rep. Series*, No. 195. Med. Research Council. H.M. Stationery Office. 3s. net). In 1921, permission was obtained to apply the Schick test of diphtheria susceptibility and immunity to the inmates of the Greenwich Hospital School; and since then up to the removal of the School from London last year, it has been possible to watch the distribution and development of diphtheria immunity and the occurrence of diphtheria bacilli carriers in this institution. In 1928, inoculation against diphtheria was introduced, allowing a comparison to be made between natural immunity acquired by a community in which diphtheria was endemic, and immunity artificially induced by inoculation. Prior to inoculation, the School was subject to an intense degree of diphtheria infection, for the average number of cases of diphtheria notified per annum was 45. In these circumstances, latent immunisation proceeds rapidly, so that it is calculated that three years' residence in the School produced an immunisation as effective as the usual prophylactic procedures, but with the danger that for every three or four latent immunisations, one case of diphtheria occurred. On the other hand, it was found that three doses of a diphtheria

toxoid prophylactic produced in 3 months as high a degree of immunity as the 3 years' residence, and with the added advantage of the almost complete disappearance of clinically recognisable diphtheria. No doubt the conditions at the Greenwich School were exceptional, and two plates, one of the boys at dinner, and the other of the sleeping quarters, illustrate the overcrowding that existed.

Bionomics of Two Estuarine Crabs. Under this title (*Proc. Zool. Soc. Lond.*, Part 4; 1933) Dr. Sunder Lal Hora describes the habits of the two Indian crabs, *Varuna literata*, Fabr., and *Sesarma tetragonum*, Fabr. The former is the commonest species of crab in the deltaic region of the Ganges. At Uttarbhag, 23 miles from Calcutta, it lives in the mud of the low-lying land in the neighbourhood of vast stretches of rice fields. During the wet season there is a good deal of brackish water, and in the dry season the earth becomes cracked into slabs which become detachable from the damp mud below, and the crabs live in these cracks. Later, when nearly all was dry, they made oblique burrows a couple of feet or so down and were found near the water-level. *Sesarma tetragonum* lives on the high banks of the water channels, digging a burrow almost vertically to the depth of the subsoil water. One was dug open and the water struck at about 5 ft., and there was about 8 in. of water in the burrow. The crabs were found above. The salinity of the water in the burrow was much less than in the adjoining channel. Neither of the crabs becomes completely dormant even at the height of the dry season when there is no food. Both have become almost terrestrial, although dependent on some moisture; they appear to want a certain amount of atmospheric air. They are thus not affected by changes of salinity so much as the truly aquatic species. The volume of the gills seems to be considerably reduced in *Sesarma*, and the gill chamber large, so that there are cavities for storing air. In *Varuna* the gill chambers are filled by the gills and no accessory devices were noticed. The author thinks it probable that the gills themselves have become specially modified for aerial respiration.

Classification of Nematodes. I. N. Filipjev (*Smiths. Misc. Coll.*, 89; 1934) considers that, in various morphological features and in their physiology, free-living nematodes, and especially the marine forms, are primitive. He agrees with Bastian that the organisation of the free-living forms "as a whole differs in no obvious or important manner from that of their parasitic kindred", and hence the group cannot be divided into two—one for free-living and the other for parasitic members. The author proposes a classification into eleven orders, and provides a key thereto and keys to the families included in six of these orders. He points out that the emphasis on parasitic forms is merely a result of the historical sequence in the study of nematodes, for systematic studies of parasitic nematodes have been carried out by numerous workers since they were initiated by Rudolphi in 1819, whereas the study of free-living nematodes began with Bastian in 1865, and only during the last fifteen years has there been a notable increase in the workers on them. A table shows that the number of species described to the end of

1930 includes 2,165 free-living and 2,436 parasitic—the latter figure being regarded as subject to correction. Among collections of marine free-living nematodes a large proportion prove to be new species, and the author gives his opinion that the marine species probably exceed in number both parasitic and fresh-water species together. Eight plates with seventy figures serve to illustrate the principal characters of five of the orders.

Diptera of Patagonia and South Chile. Two new fascicles of a work on the Diptera of Patagonia and South Chile, in course of publication by the British Museum (Natural History), have appeared. They deal with a number of families of the Acalyptrata together with the families Syrphidæ and Conopidæ. Various new genera and a number of new species are here described for the first time. The descriptions, it may be added, are accompanied by admirably clear text-figures and plates. The Acalyptrata are dealt with by Mr. J. R. Malloch, who is also jointly responsible with Miss D. Aubertin for the Conopidæ, while the Syrphidæ are described by Mr. R. C. Shannon and Miss D. Aubertin.

The Periodic Table in Plant Physiology. The late Prof. R. W. Thatcher has proposed a scheme (*Science*, May 25, 1934) for the classification of the chemical elements on the basis of their functions in plant nutrition, attempting to correlate these with the positions of the elements in the periodic table. The scheme rests on the observation that elements which are closely associated in the periodic table may be grouped together on the basis of physiological function in the plant. The chief value of the proposed scheme is that it will serve to remind plant physiologists of the existence of the periodic classification of the elements, and thus render their nutrition data more intelligible, but carried to its logical conclusion it will surely result merely in a restatement of the periodic law, that the properties of the elements (*including their biological properties*) are a periodic function of the atomic weights. It follows therefore that elements which in virtue of their similar fundamental properties are situated in adjacent places in the periodic table must necessarily serve closely similar functions in the plant. The observation that in certain cases potassium is absorbed readily by plant cells, whilst the closely related element, sodium, is excluded, provides an apparent exception, but in the ultimate analysis this difference in behaviour must be due to some difference in the specific properties of the elements relative to the living cell. That the elements concerned in nutrition are confined to the first half of the periodic table may be explained on general permeability grounds, the heavier elements being excluded. Information regarding the precise functions of the elements in nutrition is at most fragmentary except in the case of elements like carbon, nitrogen, oxygen, sulphur and phosphorus which enter into the actual structure of the cell, and do so presumably because of their peculiar valence properties and capacity for entering into large molecular complexes. In this connexion, it is significant that carbon, nitrogen and oxygen, the chief components of protein complexes, have closely similar atomic diameters.

Chromosomes of Cotton Hybrids. A cytological study of certain hybrids between Asiatic and New World cottons has been made by Dr. A. Skovsted (*J. Genet.*,

No. 3). The former have $2n = 26$ chromosomes, while most species of New World cottons have $2n = 52$. One of his hybrids had 39 chromosomes and the other 52. It is inferred that a diploid egg of Asiatic cotton functioned to produce the latter. From measurements of the chromosomes, Skovsted concludes that those of the Asiatic species are of equal size and large, while the New World cottons have chromosomes half of which are large and half smaller. In hybrids with 39 chromosomes, previous workers have found 13 bivalents and 13 univalents at meiosis. He finds many irregularities, and that groupings of 3, 4, 5 and 6 chromosomes are frequently present. The nuclei may also fuse, producing gametes with the unreduced number of chromosomes. At least 13 univalents were present in both hybrids. The conclusion is drawn that the chromosomes of Asiatic cotton are homologous with half those of the New World cottons, the other half forming the univalents. The New World cottons are therefore regarded as amphidiploid species, formed by chromosome doubling in a hybrid between an Asiatic species with 13 large (haploid) chromosomes and some unknown species having 13 small chromosomes. If this difference in the size of the chromosomes is confirmed, it should be of considerable value in helping to trace the chequered history of the cultivated cottons.

Continental Undulations of the Geoid. This is the title of a memoir (in English) by R. A. Hirvonen in No. 19, *Veroff. Finnischen Geodatischen Institutes, Helsinki*, 1934. It opens with an account of the theory connecting the form of the geoid with the variation of gravity, the work of Stokes, Helmert, Pizzetti and Hopfner being specially considered. The available gravity data are then applied to determine the order of magnitude of the warping of the geoid, and it is found that this does not generally exceed 100 metres and is on an average ± 50 m., contrary to the conclusion of Hopfner and Ackerl, whose estimate was $\pm 1,000$ m. The ellipticity of the equator is considered well-established, the longer axis being somewhat westward of the Greenwich meridian.

The Beilby Layer. G. I. Finch, A. G. Quarrell and J. S. Roebuck (*Proc. Roy. Soc.*, A, July) have obtained very interesting results which seem conclusively to demonstrate the existence of a flowed amorphous surface layer on polished metals. In their experiments, a metal layer was evaporated on to a metal surface, while the latter was being examined in an electron diffraction camera with fluorescent screen. When zinc was deposited on an etched copper surface, the normal zinc diffraction rings appeared and remained unchanged for a long time. On a polished surface, however, the zinc rings flashed up and then disappeared in the course of a few seconds. Photographs show that the rings disappear without appreciable broadening. These experiments add very strongly to the evidence for the Beilby layer of flowed amorphous metal on polished surfaces. It has been known for some time that a polished surface gives rise to a random scattering of electrons, but some uncertainty still existed about the interpretation of this result. In the present work, the zinc layer on polished copper was not readily removed by rubbing, and the zinc crystals appear to dissolve in the surface layer. Similar results were obtained with several other pairs of metals.