

Research Items

Archæology of Hawaii. A survey of the archæology of Oahu based on field work in 1930 by Mr. J. Gilbert McAllister (*Bull.* 104, Bernice P. Bishop Museum, Honolulu) has been undertaken in order to place on record such evidence as remains of the people who were in Hawaii when it was first visited by European voyagers. European culture and exotic vegetation introduced into the island are rapidly destroying the sites; but knowledge of them is still treasured by the older inhabitants. Various types of remains are here recorded. The old Hawaiian places of worship fall into two groups, large communal places of worship, for which the term *heiau* is generally employed, and small shrines at which offerings were made. The former are the most interesting remains now found on Oahu. Of these there are 27, while on 19 other sites portions remain. In size they range from 50 ft. \times 40 ft. up to 570 ft. \times 170 ft. They may be classified into walled structures, terraced structures and walled and terraced structures. The sacrificial *heiau* was the highest type. On it human sacrifices were offered, and it could be built only by a king. It was essentially a war temple. The husbandry *heiau* was used chiefly to ensure the prosperity of the people. With few exceptions the *heiau* were built of natural basalt. The smaller places of worship were fishing shrines, family shrines and road shrines, those functioning in connexion with fishing rites being by far the most important of these. The ceremony consisted in making an offering. It was made by one individual who was regarded as the guardian of the shrine. Several were sacred to certain fish only. Four shrines consisting of small enclosures were noted, but probably most shrines consisted of single stones. The family shrine was an integral part of every household; while the road shrine was a place where offerings were made to some spirit.

Ostracod Feeding Mechanisms. Prof. H. G. Cannon has already given us valuable information on the feeding mechanism of various Crustacea and has evolved a very effective technique in studying them. A recent paper, "On the Feeding Mechanism of Certain Marine Ostracods" (*Trans. Roy. Soc. Edin.*, 57, Part 3, No. 30; 1933), concerns *Asterope* and *Cypridina* and the comparison of their mouth parts. Also those of *Cytherella* are described. *Asterope* is a purely filtratory feeder with a perfect filter apparatus; no large particles are taken and there are no labral glands, the labrum being very small. *Cypridina* feeds both on large food masses and on minute detritus which it abstracts from the water in the same way as *Asterope*, but the labrum is large, with a labral gland the slimy secretion of which entangles the food particles, and there are biting jaws. Prof. Cannon believes that the asteropids are probably derived from some detritus-eating cyprinids, *Asterope* being extremely specialised. *Cytherella* is a purely filtratory feeder, the mechanism being of a similar type to that of *Asterope*, but the processes are carried on by different limbs.

Plankton of the North Sea. Mr. R. S. Wimponny in his paper "Variations in North Sea Plankton, 1923-24" (Ministry of Agriculture and Fisheries, Fishery Investigations, series 2, vol. 13, No. 3. 1933) studies the plankton of six stations running from

Flamborough Head, east by north, to the "S.W. Patch" of the Dogger Bank. This is in accordance with the recommendations of the plankton section of the Conseil Permanent International pour l'Exploration de la Mer at Copenhagen in September 1932 "that the importance of the range of variation be kept in view". In addition, some work is included bearing on seasonal variation on the "Hydrographic Line" cruises across the whole North Sea in 1923 and the spring of 1924. The importance of the edges of marine banks for supporting a rich diatom flora is shown, especially the Dogger Bank, where there was more phytoplankton than on the Flamborough line towards the shore. Peridinians always followed diatoms, *Ceratium* being very abundant. It is pointed out that those organisms which store fat as food reserves are thus succeeded by those which store carbohydrates. This has a notable physiological aspect. The distribution of *Calanus*, *Apherusa* and *Themisto* suggests their dispersion around the North Sea from west to east. The following recommendations are made: (1) a general investigation of the life-cycle of each important species individually, and its feeding habits over a wide area; and (2), a study of the direction and speed of currents in the area by direct comparison of current measurements and plankton.

Parasites of Carrion-infesting Flies. Observations on the morphology and biology of some hymenopterous parasites affecting blow-flies of the genera *Lucilia* and *Calliphora* form the subject of a recent paper by Mr. A. C. Evans (*Bull. Entomol. Res.*, 24, pt. 3). As regards the braconid *Aphaereta*, its behaviour in relation to its hosts suggests that the fore tarsi play an important function in egg-laying and possibly contain receptor organs of a tactile or other nature. The eggs of *Aphaereta* increase their volume 2,900 times between the time they are laid and when they are ready to hatch. Nourishment for the rapidly growing embryo is stated to be obtained by its diffusion through the chorion of the egg. As regards *Alysia manducator*, there is but little increase in the size of the developing egg. The modifications resulting from a gradual change from an ectoparasitic to an endoparasitic life, as revealed in the larvæ of the several genera studied, are discussed in some detail. In *Alysia* the egg can successfully develop when withdrawn from the body-cavity of its host, while the newly hatched larva bears a pair of open mesothoracic spiracles and closed rudiments of spiracles on the seven following segments. From these facts, and other structural features, such as the presence of a cocoon, the author concludes that the endoparasitism of *A. manducator* is a recent acquirement or, at any rate, has not reached the advanced condition displayed in other endoparasites of the same hosts. In a third parasite, *Habrobracon brevicornis*, which is an ectoparasite, the spiracles remain open throughout larval life, locomotory spines and protuberances are present and a well-developed cocoon is formed.

Arizona Cacti. The first Biological Bulletin of the University of Arizona Bulletin (4, No. 3) contains an account of the Arizona cacti by W. P. Stockwell and L. Breazeale. It is a non-technical compilation based on Britton and Rose's standard work, primarily intended to facilitate identification and prefaced by a short illustrated account of the vegetative and

floral parts of a cactus. A feature of the work is the large number of illustrations; line drawings of joints and spines accompany the keys to the genera and species, and photographs of most of the seventy-seven species described are included. Points of interest connected with the form and usage of the species are included in the generic and specific descriptions given in the body of the work: thus *Carnegiea gigantea* is recorded as reaching a height of forty feet and an age of 150-200 years.

A New Genus of Phycomyces. Whilst investigating certain fungi which attack snapdragon plants, Mr. C. G. C. Chesters found a peculiar fungus which produced chlamydospores in abundance, and also thick-walled spores which were often bicellular ("A Phycomycete associated with a Diseased Condition of *Antirrhinum majus*", *Trans. Brit. Mycol. Soc.*, 18, part 3, 199-214, December 1933). The fungus produces spiny chlamydospores in the host plant and also on all the numerous kinds of culture media which have been used. The formation of the thick-walled spores is described, and shown to be roughly similar to the development of zygospores, though there are important differences. No thick-walled spore has yet been germinated, and it is supposed that the fungus represents an intermediate stage between Zygomycetes and other groups of the Phycomyces. The organism cannot apparently be included in any existing genus, so the euphonious name of *Azygozygum chlamydosporum* nov. gen. et sp. has been suggested.

Origin of Apple Varieties. In a genetical investigation of cultivated apples, Messrs. Crane and Lawrence (*J. Genetics*, 28, No. 2) have obtained important results bearing on the production of new varieties. Many of the crosses between varieties produce few viable seeds and most of the resulting seedlings are lacking in vigour owing to aneuploid chromosome constitution. Among 50 varieties, varying degrees of self-incompatibility were present, but only two failed entirely on selfing. Certain varieties and crosses also produced albinotic seedlings. With this exception, intergrading variation was the rule as regards such fruit characters as skin and flesh colour, size, shape, flavour and time of ripening, indicating the presence of polymeric factors. It is known that many common varieties of apple are triploid, the remainder being diploid, none tetraploid. The n number of chromosomes is 17, while in most other Rosaceae $n=7$, or in certain genera 8 or 9. Various views of the origin of $n=17$ from the lower numbers are held, based on the secondary pairing of the chromosomes and other evidence, but all are agreed that some of the chromosomes are present several times, thus giving a basis for polymeric factors and graded inheritance. Such well-known varieties as Baldwin, Blenheim, Cravenstein and Ribston have $3n=51$ chromosomes. From Vavilov it appears that wild apples occur widely in Asia. He reports that in the Caucasus the fruits are small, while in Turkestan a great range of size and quality occurs, some wild trees bearing fruit of excellent flavour and large size.

Air Currents Around the Rock of Gibraltar. In *Geophysical Memoir* No. 59 of the Meteorological Office, J. H. Field and R. Warden describe "A Survey of the Air Currents in the Bay of Gibraltar, 1929-30", but the investigation, which was undertaken owing to accidents to aircraft in the lee of the Rock of

Gibraltar, was confined to the disturbances set up by easterly winds, these being of the greatest practical importance to aviation. The work divides itself into two distinct sections; first, experiments with a model of the Rock on a scale of 1:5,000 in a wind tunnel at the National Physical Laboratory, and secondly the study on the spot of actual wind currents at different heights with the aid of pilot balloons and kites, in order to form an idea of the extent to which the system of currents observed in the wind tunnel corresponds with reality. The unusually large figure for the scale ratio model: actual (a ratio somewhere between 1/10 and 1/200 is usual in work of this kind) made this practical verification the more necessary, but it was found that on the whole the indications of the model were reliable in so far as they gave a correct picture of the directions of the different currents and of the types of permanent or temporary eddy set up. Great turbulence extended for fully two miles to the west of the Rock in easterly winds, from sea-level up to at least a height of 5,000 ft. The system of vortices included two that were large and permanent for a given wind direction, and with a shift of wind from due east there was generally a corresponding shift of the areas of danger, and at the same time changes in the permanent vortices. For the immediate purpose of the inquiry—the avoidance of further accidents—the most important item in the work is probably the map showing the positions of the danger areas for different wind directions, but there are many items of interest to meteorologists; for example, the conclusion that the obstruction caused by the Rock in a wind of only Beaufort force 6 caused vertical velocities of about twenty-five miles an hour for short periods. The conclusion was also reached that in such investigations the use of a kite balloon for a single day can give more information than many months of pilot-balloon work.

Action of β - and γ -rays on Rock Salt Crystals. When crystals of rock-salt (and many other substances) are exposed to β -rays, γ -rays or X-rays, they acquire a new spectral absorption band (giving a characteristic colour) and a photoelectric conductivity when illuminated by light frequencies within this band. Burbidge (*Proc. Camb. Phil. Soc.*, 30, Part 1) has made experiments on this effect. Using small exposures to the activating agent, he found that the photo-current obtainable died away with time, so that in a few minutes he could collect all the charge that the crystal was capable of carrying. If the crystal is left in the dark, the 'activation' gradually decays, but in any event the number of electrons collected is only of the same order as the number of β -particles or γ -quanta absorbed. This is peculiar, since it is known that ultra-violet light of quantum energy 5 volts will cause activation and the β -particles have, of course, energies of 10^5 - 10^6 volts. It is suggested that the activation is confined to comparatively rare centres such as foreign atoms or micro cracks. During the activation, a large number of electrons are disturbed from their normal levels to the lattice conduction levels, but except at such singular points, they rapidly revert to their original state. At the singular parts they revert to comparatively stable intermediate levels from which they can be raised by the absorption of blue-light quanta. Further work is contemplated—it would clearly be very interesting to determine the efficiency of activation for ultra-violet radiation of comparatively low quantum energy.