RESEARCH ITEMS

Archæology of Fanning Island

FURTHER information relating to the ruins of Fanning Island, one of the equatorial islands of the Pacific, was obtained by Kenneth P. Emory in 1934 when he visited the island again after an interval of ten years (Bernice P. Bishop Museum, *Occasional Papers*, **15**, 17; 1939). Three additional ruins were noted and examined and four basalt adzes found after the departure of the first expedition were studied. The three ruins now described lie on a ridge of sand along the south side of a trail from the lagoon jetty and the cable station. Of the first only a small pile of coral 10 ft. in diameter and a foot high remains. Several small slabs on edge are planted here and there, and an area less than 16 ft. is covered with scattered stones. The next structure, nearly 60 yards to the west, is a small collection of loose slabs which may originally have formed an alignment. The third ruin, 47 yards farther west, is the most definite. It seems to have been a mound or platform covering two vaults constructed at ground-level. At the south end kerbs mark a rectangle 6 ft. by 10 ft. Around the outside edges are many loose slabs in disorder and smaller stones which must have served as the fill of a grave or have formed a platform built over the vault. Human teeth, fishbones and one-piece fishhooks found within the rectangle point to its use as a grave. Firmly embedded kerbs and two large limestone slabs north of the rectangle suggest another grave. There is a suggestion of a retaining wall at the north border of the ruin. About 400 ft. south-west is a place where limestone slabs had been quarried in ancient times. The four adzes resemble those of Samoa and Tonga, and not those of the Marquesas, Hawaii, Cook Islands, Society Islands and other groups of marginal Polynesia. The fishhooks, composite and one piece, relate to Tonga. The dressed stone enclosure has affinities with the royal burial places of Tonga and its sixteenth century dressed stone work, but nothing like it is found outside Tonga. The marking of burials with conspicuous superstructures of stone is a strong feature of western Polynesia, weak or absent in eastern and marginal Polynesia.

Folding of the External Ear of Lorisoid Monkeys

THE ear pinna of Galagos and their relatives is capable of a peculiar folding designed to protect a sensitive organ and brought into action when the animals desire to avoid objects which might cause physical injury. If some object is suddenly thrust towards the ear it immediately retracts, and retraction is the typical condition in sleeping animals. W. C. Osman Hill finds that the ears of the Lorisoid genera Loris, Nycticebus and Galago are characterized by having transverse discontinuities in their cartilages near the upper extremities (*Ceylon J. Sci.*, Sect. 13, **22**, 135; 1940). These discontinuities are bridged over by perichondrium and are connected with the presence of a lamina of striped muscle fibres (corrugator pinnæ) under the control of the will. Some of the differences between Loris and Nycticebus on one hand and the Galagos on the other are associated with the more active habits of the latter, which demand a more sensitive, in other words a more expanded organ, and hence one that is more actively contractile. Tarsius differs from these genera in lacking all these specialized structures, but is more typical in possessing a tragus.

Californian Trout

COMPARED with the meagre range of trout species in Britain, Californian rivers and lakes contain remarkable variety. John O. Snyder lists nine species of Salmo belonging to the rainbow trout series, four species in the "cut-throat" series, and one species of char, *Salvelinus spectabilis*. Not satisfied with these, enthusiasts have introduced Loch Leven trout from Scotland, and four other species from various parts of the United States (*Calif. Fish and Game*, **26**, 96; 1940). Short descriptions of all these species, some illustrated by photographs and coloured plates, indicate salient characters, and brief accounts of migration and the barriers to migration, scale-reading, conservation, food-habits, artificial propagation and distribution have been contributed mainly for the information of anglers and the inquiring layman.

Ripening of the Banana

THE banana differs from many other fruits in that cut from the tree (after allowing some forty days for early stages of development) it will continue to ripen—none the less the developmental processes at work whilst on the tree probably have a determining influence in respect of the time limits at which fruit may be cut for exportation. Considerable practical importance probably is attached, therefore, to such studies as those described by H. R. Barnell, of the Low Temperature Research Station, Imperial College of Tropical Agriculture, Trinidad (*Ann. Bot.*, N.S., **4**, 1940). He has followed the changes in dry matter and various types of carbohydrates and acidity in the pulp and skin of the fruit, during development in the plant, from the time the fruits emerged until they rotted. It had been proposed to study the quality of fruit left to ripen on the plant, but in these Trinidad observations, after the 'hundredth' day, the fruit began to split and then to fall and rot. It would seem that the Gros Michel variety under these conditions is more suited to picking at an incipient ripening stage and export than for home consumption as ripe fruit gathered from the plant. The banana is relatively unusual also in the low sugar content in the early stages of development, when starch is rapidly accumulating; the splitting later is associated with a rise in water content of the pulp as the sugar content begins to increase. Off the plant bananas at this period will ripen with sugar formation in the pulp, but there is less danger of splitting as only a relatively small amount of water can migrate into the pulp from the skin. Unlike the apple in its high starch accumulation and low sugar concentration, the banana also differs in that along with starch synthesis there is a continuous fall in the acidity of the pulp—rising acidity values are only met with as starch hydrolysis begins after about the 'hundredth' day.

Life-Cycle of *Blastocladia Pringsheimii*

THE discovery, by Kniep in 1929, that the water mould *Allomyces javanicus* exhibited heterogamy of flagellate gametes, focused attention upon closely related fungi for the possibility of similar phenomena. Elizabeth Blackwall has studied the life-history of an allied species, *Blastocladia Pringsheimii* (*Trans. Brit. Mycol. Soc.*, **24**, Pt. 1, 68–86; June 1940). Resting spores were successfully germinated, but no gametes were demonstrated. Motile swarmers appeared, however, and formed germlings which grew directly into the characteristic pustule. There is, therefore, as yet no evidence of a sexual phase in this life-cycle, but the demonstration of apparently non-sexual swarm spores in a Phycomycete is nevertheless of considerable mycological interest.

Genetics of Verbena

G. H. BEALE (*J. Genetics*, **40**, 339–358; 1940) shows that the garden Verbena derives its variation from two sources. The first source is derived from hybridization between four species of Verbena. Eight gene differences are presumably derived from this hybridization; these show various degrees of dominance. On the other hand, ten gene differences resulting from mutation during the last hundred years show complete dominance of the 'wild type'. There are two series of triple allelomorphs in which the extreme dominant and recessive members produce a similar phenotypic effect, which differs from the intermediate member of each series. Aberrant ratios, modifying factors and exceptionally close linkages are probably related to the hybrid origin of the garden Verbena.

Theory of Differential Periodicity

G. F. SLEGGS (*J. Genetics*, **40**, 385–392; 1940) has amplified his theory of differentiation of an organism. He suggests that differentiation is due to the direct action of genes which are arranged on the chromosome at various angles of rotational stagger. The formation of new nuclei is equivalent to the spreading of chemical lattices in superimposition, thus producing an optical pattern. Such staggering of genes in the chromosome column produces strain which gives rise to the high synthetic activity of living matter. Sexual interaction involves chemical union between gene columns of different stagger form, thus intensifying synthesis (growth) in the diploid. Crossing-over, dominance, lethal genes, the origin of species, and species divergence are discussed in relation to this theory.

Use of Refrigeration to Delay Age-hardening

THE age-hardening which takes place in duralumin after the normalizing treatment brings about a pronounced and rapid decrease in ductility. Whereas the effects of age-hardening on the proof stress, ultimate strength, and hardness require about four days for completion, a decrease in ductility sufficient to interfere seriously with cold-pressing operations takes place in rather less than two hours. It is known that the rate of age-hardening can be retarded by lowering the temperature of storage of the freshly normalized material. Experiments have been carried out by Arrowsmith and Wolfe (*J. Inst. Metals*, **66**; 1940) to demonstrate the relationship between this temperature and the rate of age-hardening, with the object of determining the maximum temperature at which a desired increase in permissible storage time can be obtained. A practically convenient time is four days, and this is made possible by storing at a temperature of $-6°$ to $-10°$ C.

Impregnation of Poles with Copper Sulphate

AN abstract of an article by Yosio Nakazima, on the rapid deterioration of poles impregnated with copper sulphate, has been published in the April number of the *Quarterly Journal of the Institute of Electrical Communication Engineers*, Tokyo. The author, who is a member of the Sendai Bureau of Communications, gives an account of an investigation carried out to find why copper sulphate impregnated poles erected in a certain district by the Sendai Bureau deteriorated so rapidly. Experimental investigation showed that it was due to the properties of the ground where the poles were erected, the ground becoming alternately moist and dry and thus dissolving the copper sulphate. A preserving band for preventing this was purchased in the market, but it was no more effective than the procedure previously carried out of scraping away the rotted portion and coating it with creosote. Poles impregnated with creosote by the Bessel process are best suited to this kind of soil. In the present method of investigation, much importance is placed on the amount of copper sulphate per average cubic metre, and little attention is given to the uniformity of the cross-sectional presentation. It was found that this uniformity was most important. It is believed that by diluting the solution used at present for impregnation to a density that would deposit about 3·5 kgm. of copper sulphate, and by impregnating the pole well and uniformly, the same degree of protection can be attained as in present practice. This subject well deserves further study, especially from the economic point of view. The original paper gives a discussion of the method used at the Sendai Bureau of Communications for testing the finished impregnation.

Solar Faculæ and Solar Constant Variations

H. ARCTOWSKI read a paper on this subject at the annual meeting of the U.S. National Academy of Sciences held during April 22–23. The daily solar constant values for the years 1926–1930 have been compared with the areas of faculæ in order to search for the direct correlation between solar phenomena and the variations of solar radiation advocated by C. G. Abbot. The solar constant data have been taken from vol. 5 of the *Annals* of the Astrophysical Observatory of the Smithsonian Institution and those of the areas of faculæ from the results of measures made at the Royal Observatory, Greenwich, of photographs of the sun taken at Greenwich, at the Cape and in India. It has been found that the mean values for the days of maxima and minima of the solar constant and the five days preceding and following these days give curves similar to those of the faculæ of the same dates. The mean maximum as well as the mean minimum of the solar constant variation, however, are slightly in advance of those of the faculæ.