

## Research Items

**Abyssinian Games.** In the course of two expeditions to Abyssinia (1928-29 and 1932), M. Marcel Griaule collected notes on more than four hundred games and recreations of the Abyssinians, of which he has published a selection (Bibliothèque de l'École des Hautes Études: Sciences religieuses, 49, Paris, Lib. Leroux, 75 fr.). They range from games involving the use of simple musical instruments and simple apparatus such as tops, balls, string, etc., to singing and dancing, games, rhyming, riddles and animal tales. Many of the games have a divinatory character, and it is noted that there is throughout Abyssinia a strong belief in the efficacy of children as agents of divination. Certain general principles are to be observed in the collection of games in Abyssinia. Between one district and another there may be a marked difference in the games played, or the rules of the same game may differ widely. The areas within which any variation obtains may be very restricted. In part this is due to the numerous strata of the peoples who have penetrated the country, and also to the consistent policy of the Abyssinians in enslaving and transporting peoples socially less highly organised than themselves. Further, the geographical configuration of the country is responsible for some variation, especially in those games which make use of plants. The high plateaux with their relatively cold climate are split up by low-lying valleys with a climate which varies rapidly in narrow zones from the relatively cold of the heights to tropical in the low-lying parts. The vegetation varies accordingly and with it the character of the games in which it has a function. The variation of climate may also affect the character of the games in other ways. It is, therefore, not sufficient to study the games as distributed by provinces. Their investigation must be highly localised. A further discrimination must be exercised in accordance with the season; and in others the age and sex of the players has to be noted. The solemnity with which some of the games are played, and occasionally their long duration, as in the taboos of Carême, leave it beyond doubt that their origin is religious or magical.

**Gulper Eels.** The Carlsberg Foundation's oceanographical expedition round the world in 1928-30, and previous *Dana* expeditions under the leadership of Prof. Johannes Schmidt, have resulted in the acquirement of a vast amount of new and valuable oceanographical and marine biological data. Papers embodying the results of these various expeditions have appeared in a large number of scientific journals. Since the conclusion of the 1928-30 expedition, however, a series of special "Dana Reports" has begun to appear. These reports will continue to be published at intervals over a number of years and may be obtained from the Oxford University Press. *Dana* Report No. 3 on "Les Poissons Apodes appartenant au Sous-ordre des Lyomères" (the so-called gulper eels), by Leon Bertin, deals with the morphology, classification, and geographical distribution of the genera *Saccopharynx* and *Eurypharynx*. The relatively very comprehensive *Dana* collection of these fishes consisted of 5 individuals of *Saccopharynx* out of a total of 14 known specimens and of 59 *Eurypharynx* out of the 122 so far known. In the latter genus the author recognises (at least provisionally) two species,

and in the former, four species, two being here described for the first time. The whole paper is based on the examination of adult fishes. A further memoir on larval and post-larval stages is promised.

**Systematics of Rhizopoda.** Henri de Saedeleer (*Mem. Mus. Roy. d'Hist. Nat. Belgique*, No. 60, 1934) divides the Rhizopoda according to the nature of their pseudopodia into three orders, the first two of which were already defined, Lobosa, Filosa and Granuloreticulosa, the third including Rhizopoda with filamentous pseudopodia which may exhibit many or few anastomoses and streaming of granules. This third order includes the suborder Athalamia, such as *Gymnophrys*; Monothalamia, for example, *Allogromia*; and Polythalamia, that is, the Foraminifera which are not included in this memoir. The characters of the further subdivisions—families, subfamilies, etc.—are followed by accounts of twenty-nine genera and fifty-eight species. From his studies on a large amount of living material from Belgium, from fresh water and from the seashore, the author has provided useful line drawings of most of the species. Four new genera and seventeen new species are described.

**Empire-Grown Sisal for Marine Cordage.** The Imperial Institute has recently published (February 1935. 1s.) a report upon tests carried out in conjunction with the Admiralty of tarred and untarred cordage made from East African sisal. As Manila hemp does not absorb tar satisfactorily, such cordage in the past has generally been made from European hemp. In order to investigate the effect of tarring on the durability of sisal cordage, the Admiralty has recently carried out a further series of experiments. Ropes, three inches in circumference, were prepared from East African sisal, one batch being made in the ordinary way from untreated fibre and another from yarn which had been passed through a bath of Archangel tar. Both kinds of rope were exposed to the action of sea-water for periods of two, four, six and nine months, their breaking strain being determined at the end of each period. It was found that after exposure to the action of sea-water for nine months, the untarred sisal rope had lost 76 per cent of its initial strength, whereas the strength of the tarred sisal rope had fallen only 29 per cent. The tests have thus shown that the life of sisal ropes when exposed to sea-water is enormously prolonged by tarring. The Admiralty is therefore considering the general adoption of tarred sisal cordage in place of tarred European hemp cordage, and inquiries are being made as to the extent to which such substitution could be carried out.

**A Disease of Pomegranate.** A short paper by H. Chaudhuri and Jagtar Singh (*Trans. Brit. Mycol. Soc.*, 19, Part 2, 139-144, January 1935) describes a disease of pomegranate, *Punica granatum*, L., in Lahore, India, caused by the fungus *Amphichaeta punicea*, n. sp. Infected twigs bore numerous pycnial fruit bodies; and the tree was stunted, but seldom killed. Infection experiments proved that the causal fungus was a new species belonging to the genus *Amphichaeta*, for which the name *A. punicea* has been suggested. Morphology, cultural characters, and the effect of various external factors on growth of the fungus are described.

**An Earthquake Magnitude Scale.** It is usual to estimate the intensity of an earthquake in terms of some arbitrary scale, such as the Mercalli or Rossi-Forel. The results may, however, be untrustworthy owing to variations in the nature of the ground, the depth of the focus or, in some cases, to the origin being submarine. In a recent paper (*Bull. Amer. Seis. Soc.*, 25, 1-32; 1935), Mr. C. F. Richter shows that a comparison of the maximum amplitudes recorded at different epicentral distances by the Wood-Anderson torsion seismometers at the seven stations in South California makes it possible to estimate earthquakes as a whole in terms of a magnitude scale. The magnitude of a shock is defined as the logarithm of the calculated trace amplitude, expressed in microns, with which the seismometer would register that shock at an epicentral distance of 100 km. Such magnitudes can be assigned to the nearest half-unit or less. Shocks of magnitude 1.5 are just strong enough to be felt, those of magnitude 4.5 may cause slight damage near the epicentre, while those of magnitude 7.5 are at the lower limit of great earthquakes. For example, among recent Californian earthquakes, that of Long Beach in 1933 was of magnitude 6.2, and that of Nevada in 1932 of 7.5.

**River Dee Flow Records.** The brochure recently issued by River Flow Records (Parliament Mansions, Victoria Street, S.W.1) on the River Dee (Aberdeenshire) contains extremely serviceable information concerning the water-levels, rainfall and run-off in the basin of that river for the year 1934. There are four introductory statements of an explanatory character, dealing with the daily rainfall distribution, the Woodend flow-gauging station, the Cairnton water-level station and, finally, with the diagram records for the year. The diagram records, four in number, with a prefatory map, have been designed to obviate the publication of lengthy and numerous tables, and each of them covers a period of three months. The originals of the diagrams are  $2\frac{1}{2}$  times the scale of the plates, and prints therefrom are stated to be available, if required. On the rainfall and run-off diagrams the aggregate run-off starts from zero on January 1 and amounts to 39 inches by the end of the year. The aggregate of rainfall starts with a credit of 0.39 inch, which is the minimum residual run-off for the water-level of January 1, under de-saturated conditions. The story of the year is briefly the desaturation of the early months, shown by excess of run-off, merging into the evaporation losses of the later spring; followed by the high evaporation losses of the summer and re-saturation losses of the early autumn, and ending with a saw-saw of saturation and de-saturation during the late autumn and winter. There is an interesting appendix on the cost of river flow records, showing that an annual expenditure of about £100 will cover the whole scope of the work for a fully equipped flow-gauging station on rivers of 100 ft.-200 ft. in width. This expenditure falls roughly in equal proportions under four heads: interest on capital expenditure; maintenance, observations and tabulation; compilation of completed records; publication.

**Combination Tones and Modulated Waves.** H. Hazel (*Phil. Mag.*, Jan. 1935) has carried out some experiments which clarify the explanation of the famous Helmholtz-König controversy on the objective existence of combination tones. He shows that the addition of sinusoidal components, whether these are

sound waves or wireless waves, does not produce combination frequencies unless the disturbances are impressed on a non-linear system. The multiplication of sinusoidal components (modulation) does give combination frequencies which can be detected by a linear arrangement, and if two sinusoidal disturbances are impressed on a non-linear system, 'product terms' are found in the motion of the latter which correspond to a modulation and hence to the production of combination frequencies.

**Deuterium Content of Ordinary Water.** Both the H/D (hydrogen to deuterium) ratio in ordinary water and the question of the existence or non-existence of the electrolytic separation of the oxygen isotopes have been subject to some doubt. H. L. Johnston (*J. Amer. Chem. Soc.*, 57, 484; 1935) describes the preparation of deuterium-free water (less than 1 D atom to  $10^6$  H atoms) by electrolysis, and density determinations by a totally submerged float. The results correspond with an abundance ratio of  $5750 \pm 250$  for H/D in ordinary water, which confirms the figure of  $5000 \pm 500$  obtained by the mass-spectrograph by Bleakney and Gould. The electrolytic separation factor for  $O^{16}$  relative to  $O^{18}$  was found to be 1.008, which proves the futility of attempting to prepare pure  $O^{18}$  or  $O^{17}$  by electrolysis. From the H/D ratio of 5750 the atomic weight of normal hydrogen is calculated as 1.00795 on the  $O^{18}$  scale, or 1.00770 or 1.00775 on the chemical standard of  $O=16$ , according to the abundance ratio of  $O^{18}$  of Manian, Bleakney and Urey, or of Mecke and Childs, respectively. These figures are based on Aston's figure of 1.00778 for  $H^1$  and Bainbridge's value of 2.01363 for D. It may be remarked that Ingold and Ingold have recently reported an abundance ratio of H/D of 9000 (*NATURE*, 134, 661; 1934).

**Piperidine, the Alkaloid of *Psilocaulon absimile*.** C. Rimington, research fellow under the Empire Marketing Board, reports the isolation of the toxic alkaloidal constituent of *Psilocaulon absimile*, N.E.Br., and its identification as piperidine hydrochloride (*S. African J. Sci.*, 31, 184, Nov. 1934). The Aizoaceæ, of which *P. absimile* is a member, have on occasion caused the death of stock, but the chemical investigation of their constituents has received little attention. In the present investigation, a straightforward acid-alkali extraction process isolated the alkaloid, which was identified as piperidine by the preparation of the picrate, aurichloride and platinichloride. The picrolonate was also prepared. The pharmacological action of the salts on rabbits and frogs confirmed the chemical identification. The investigation has both chemical and botanical interest, since piperidine itself has not hitherto been found as a naturally occurring plant alkaloid. But the importance of the work lies in its possible economic application and in the additional evidence it provides of the wisdom of the policy of subsidising research which the Empire Marketing Board adopted. One pound of piperidine can be obtained from 10 kilos of the dried plant with the aid of such cheap chemicals as caustic soda, hydrochloric acid, chloroform and light petroleum. Piperidine has certain commercial uses, and the high cost of the synthetic substance offers scope for the commercial production of the natural alkaloid from *Psilocaulon*. It may be no more than a coincidence that the list price quoted in the paper is £6 8s. 0d. a lb. while to-day it may be obtained for £2 9s. a lb.