

levels have a very varied range of light organs and are deep red to bluish-black in colour. The tentacles may become long and whip-like with minute suckers, as in *Mastigoteuthis* and *Bathyteuthis*. Accompanying these external features there are often reduction of radula and loss of ink sac, with a general degeneration of musculature which is largely replaced by a gelatinous layer. *Heteroteuthis dispar*, with its luminous secretion, often regarded as a deep-water species, is usually captured in the upper 300 m. Dr. Rees's contribution was illustrated with colour transparencies of the various species under consideration.

A short discussion followed, in the course of which Mr. B. B. Boycott (University College, London) suggested that analysis of the variety of fin sizes and shapes shown in the animals described by Dr. Bidder and Dr. Rees can be made in terms of the stability requirements of their differently shaped bodies and arms. He reported observations on *Sepia officinalis* and *Loligo vulgaris*. *Sepia* is slightly lighter than water, and relatively broad and short: the two fins are long, movable, muscular flaps, one on either side of the visceral mass. *Loligo* is slightly heavier than water, and relatively narrow and long: the two fins are triangular flaps confined towards the apex of the visceral mass. In both animals when swimming fast ('giant fibre response'), the fins are shut down against the body. When moving gently, waves pass down the fins corresponding to whether the animal is moving forward, backwards or turning. The major propulsive force in both cases is produced by jets of water from the funnel. If the fins are removed in *Sepia*, manœuvring is not much impaired, though the animal does not maintain its position in the water as well as usual but tends to drift towards the surface. The main defect is that it rolls when moving. The fins therefore give the animal lateral stability during gentle swimming. This is probably true also for *Loligo*; but since the funnel is at one end, the fins probably also serve to keep the apex of the visceral mass up when the animal is going forwards and down when it is going backwards. That this is so is indicated by the fact that the head is higher than the visceral mass when moving forwards and lower during backwards motion.

### RECENT FLORISTIC STUDIES: BRAZIL, GUATEMALA AND TANGANYIKA

THE following floristic studies have recently been published.

In the Smithsonian Miscellaneous Collections (126, 1, pp. 1-290, with 128 illustrations; 1955), L. B. Smith has given a comprehensive account of the Bromeliaceae of Brazil, based on long and intensive observations. In preparing this work, the author has taken into account the particular interest of this group from the point of view of vegetative propagation, economic and horticultural uses—the pineapple belongs here—and, in some areas, the need for eliminating bromeliads in effecting the control of malaria. A classification of Brazilian Bromeliaceae made some twenty years ago comprised some five hundred native species; but since then 135 additional species have been discovered, and others are coming to hand. An account is given of the sources of

information (herbaria and earlier published work), geographical distribution and origin, and keys to the three sub-families and their genera and species, with line drawings of representative species.

A further contribution to the "Flora of Guatemala", Part II, "Grasses", by J. R. Swallen (with the section on "Bamboos" by F. A. McClure), is published as volume 24, Part II, pp. 1-390, of *Fieldiana*, 1955 (Chicago Natural History Museum). In this treatise, the author includes 120 genera and 455 species, native and introduced. This very considerable number of species is attributed in part to the diverse habitats, from tropical lowlands to sub-alpine meadows, which the territory of Guatemala provides. The largest genera are *Panicum*, *Paspalum* and *Andropogon*, these comprising about one-third of the total grass species. In conformity with the general arrangement of this Flora, the genera and species are set out in alphabetical order. An evident disadvantage of this is that certain closely related genera and species may be widely separated in the text. More than a hundred clear line drawings add to the value of this work.

The extensive hydrobiological survey of Lake Tanganyika, undertaken during 1946-47 under Belgian auspices, has yielded a further report, in which accounts are given, by different authors, of the Characeae, Hepaticae, Pteridophyta and certain families of flowering plants of the Lake region. ("Exploration Hydrobiologique du Lac Tanganika (1946-1947): Résultats Scientifiques." *Inst. Royal des Sci. Nat. de Belgique*, 4, Fasc. 2, pp. 1-82; Brussels, 1955.)

### NATIONAL OCEANOGRAPHIC COUNCIL

#### REPORT FOR 1954-55

THE chief instrument of the National Oceanographic Council is the National Institute of Oceanography at Wormley, near Godalming, and the two main fields of study pursued at the Institute are marine biology (centred about problems concerning the Antarctic whale fisheries) and marine physics (involving mostly studies of surface waves, wind stress, and more recently, storm surges). The annual report for 1954-55, recently issued\*, shows that relatively little work is done in marine chemistry and submarine geology. A comparative analysis of publications of the two leading oceanographic institutions in the United States suggests that the scientific programme of the National Institute of Oceanography most nearly resembles that of the Woods Hole (Mass.) Oceanographic Institution. The Scripps Institution, at La Jolla, Calif., places additional emphasis on biology, geology and chemistry, in descending order, and in this sense the Scripps Institution appears to present the most balanced programme. That the National Institute of Oceanography compares so favourably with the American institutions is all the more impressive when one considers that it is about one-third the size of either of them (inasmuch as budget and total number of persons employed are an index of size).

\* Annual Report of the National Oceanographic Council, 1 April 1954-31 March, 1955. Pp. v+33. (Cambridge: At the University Press, 1956.) 5s. net.

The work of previous years on the measurement of ocean waves has served the National Institute of Oceanography as a nucleus for an expanding programme in the action of winds upon the sea. Directly following the Second World War, work was confined to the measurement of sea waves, computation of power spectra, and a qualitative interpretation in terms of the ocean-wide distribution of storms as revealed by weather maps. The present annual report shows that the wave studies have expanded in scope; for example, a serious attempt is being made by Dr. M. S. Longuet-Higgins to measure vertical displacement of the water surface and instantaneous atmospheric pressure at the water surface simultaneously—a type of measurement that is essential for developing a clearer physical understanding of the mechanism of wave generation. Dr. Longuet-Higgins has also developed an elegant theory of the statistical properties of a random moving surface—a form of mathematical language particularly suitable for the statement of the properties of the ocean surface and most necessary for a future physical theory of the generation, propagation and dissipation of ocean waves. Also under way are several ingenious programmes for the observation of shallow drift currents due to the wind, studies of natural oscillations and storm surges in large basins such as the North Sea, and preparations for the Institute's part in the coming International Geophysical Year.

To describe in detail each of the studies reported for 1954–55 and to name each investigator would be to reproduce the annual report in substance. My selections or omissions do not imply any evaluation or criticism; they merely reflect varying degrees of personal interest and the necessity for keeping this review brief. However, mention should be made of Dr. J. C. Swallow's newly developed neutrally buoyant float for tracing deep currents in the ocean. One hopes that the new float will lead to a reawakening of interest in the problem of the general circulation of the ocean, a problem which has lain dormant for about twenty years largely because no adequate means existed for measuring directly the deep-sea circulation. The problem of describing the deep-sea circulation accurately—and independently of present-day hypothetical elements—is of considerable practical importance because so many eyes are cast toward the oceans as a place for the ultimate disposal of wastes from nuclear reactors. It is known that certain seas, like the Black Sea, are virtually stagnant beneath the top hundred metres and that these deep waters might possibly serve as an ideal dumping-ground for large volumes of radioactive wastes, barring a climatic catastrophe and a sudden turnover of bottom water.

The deep waters of all the oceans are isolated from the surface to a much lesser extent. The question then arises as to whether one can tolerate a fairly high level of radioactive waste in the deep ocean water without contaminating the surface. The oceanographer cannot at present give an affirmative answer to this question, but certainly Dr. Swallow's new device is the first glimmer of hope that we shall soon describe deep-sea currents more accurately. Before the War most of the effort of oceanographic institutions was directed toward exploring the large-scale ocean circulation. At present, only about 5 per cent of the publications issuing from the National Institute of Oceanography and from the Scripps Institution of Oceanography concern the general

circulation of the ocean. The percentage from the Woods Hole Oceanographic Institution averages somewhat higher, due probably to its proximity to the Gulf Stream. The present paucity of investigation of the really deep sea in Britain and the United States will doubtless be remedied through the stimulus of such new techniques as that of Dr. Swallow, because of the increasing pressure for definite information from those concerned with nuclear energy and as a result of theoretical advances in dynamical meteorology. HENRY STOMMEL

## CARNEGIE UNITED KINGDOM TRUST REPORT FOR 1955

THE forty-second annual report of the Carnegie United Kingdom Trust, covering the year 1955\*, is of special interest for its review of the quinquennium 1951–55, during which grants totalling £558,495 were paid, and for the statement of policy for the next quinquennium, which is appended. The development of the visual arts scheme, which was a new venture during 1951–55, has been most encouraging, and a larger allocation is contemplated in the new quinquennium. New life has been infused into many small museums, which have been converted into lively centres of culture and of education through recreation, and the Trust has joined with the Museums Association in urging on the Government the need for State aid to the national museums as the only real hope of retrieving a serious situation. In the field of community services the largest single determining factor during the past five years has been the Trust's awareness that problems of material want have given place to problems of personal, family and community relations, and both the Community Services Committee and the Education Committee have been concerned with research into the causes of social problems arising in families, into the effectiveness of new techniques for dealing with family problems, the development of family case-work agencies, experimental projects for restoring problem families to health, demonstration homes for delinquent boys and for the homeless sick, re-training of social workers and counsellors and the development of a new university course designed to produce general practitioners in social work.

The rehousing of the Scottish Central Library and several other building projects accounted for half the Trust's expenditure during the quinquennium, but the passing of legislation which brought the Scottish Central Library, during 1955, into financial independence of the Trust completed the Trust's historic contribution towards the development of the public library system. Building projects which the Trust has recently supported are used for housing its beneficiaries or for accommodating services it wishes to support, and have been designed to meet needs which have not so far been comprehended in the provisions of the Welfare State; the Trust also emphasizes its intention to keep a proper balance between rescue work and amenity.

The statement of policy for the quinquennium 1956–60 points out that the Trust prefers to con-

\* Carnegie United Kingdom Trust. Forty-second Annual Report, 1955. Pp. viii+92 (9 plates). (Dunfermline: Carnegie United Kingdom Trust, 1956.)