

met by improvements in a simple but ingenious method of recording the orientation and inclination of a container moored in the current. Echo soundings made along 12,000 miles of the ship's track have included detailed surveys of the Porcupine Bank (from which rocks were collected) and large sand waves on the continental shelf to the west of the English Channel which attain 40 ft. in height and 3,000 ft. between crests.

Research on processes operating at the sea surface, in particular wind waves, has been mainly directed at finding a convenient way of measuring the directional distribution of wave energy and to the development of an adequate physical theory relating the wave spectrum to wind, stability, and other factors governing turbulent shear and the exchange of energy between atmosphere and ocean. Theoretical studies of the curvature of random surfaces and the distribution of intervals between 'crests' of random functions enable directional information to be derived from aerial photographs of waves. Other theoretical studies of far-reaching practical significance have been concerned with the estimation of the mean wave energy from the highest waves in a record; with the accuracy of wave measurements using accelerometers in buoys or ships; with the vertical components of motion of a ship heading into sea waves; with the relative merits of empirical formulae for wave and swell prediction; and with long waves and storm surges. Tidal records initiated by the Institute at Stornoway and Lerwick support the theoretical conclusion that surges arriving from the Atlantic are amplified on passing down the east coast and suggest that large surges are most likely when intense storm depressions travel from the south-west for a long distance along the continental shelf.

The Institute is still the chief protagonist of the wave-interference theory of microseism generation. While there is still need for clarification, it has proved possible to track isolated storms in the North Atlantic by analysis of microseism activity at Kew. There is a practical application in tracking storms and giving warning of heavy swell on coasts facing oceans that have little meteorological cover. An electronic seismograph has been constructed which allows exceptional magnification in the 3-10-sec. range. Other instruments in the course of development include an airborne radar sea-swell recorder and a pressure recorder of high precision which, when used to record waves, can be calibrated by tidal observations.

The Institute's biological work falls into three broad groups: the distribution and taxonomy of marine animals, particularly oceanic plankton, based to a large extent on the *Discovery* collections; the bionomics of whales; and the productivity of oceanic waters. Objects of study last year included: the alcyonarians (revision of the pennatularian genus *Umbellula*); certain families of the isopods (fifteen species, of which five and one family are new); deep-living chaetognaths (including a new species with a method of fertilization hitherto unknown in this group); the distribution and life-cycles of the Antarctic copepod *Calanoides acutus* and of the euphausiid *Euphausia triacantha*.

During a spring cruise to the Canary Islands, additions were made to the collection of photographs of oceanic animals, ranging from small planktonic forms to moderately large cephalopods, including a dramatic sequence at 500 m. in which a squid was attacked and eaten by another squid. Observations on the composition and numbers of phytoplankton and zooplankton, compared with those made in the same waters on previous cruises, emphasized the remarkable stability and constancy of the crops in this part of the open ocean in different years. During this and other cruises, particular attention has been paid to the factors controlling rates of assimilation of carbon in regions of dense and sparse phytoplankton, and to the significance of the ratios of chlorophyll *a* and *c* in coastal and oceanic regions.

Largely through the help of whaling inspectors and companies the Institute has been able to examine ear plugs and ovaries from several hundred whales. Ear plug laminations and the corpora albicantia in the ovaries are indices of age and provide valuable evidence on life-histories, rates of ovulation, and on year-to-year changes in the stock. Recovery of whale marks has consolidated and extended earlier inferences about distribution, migrations, and interchange between the south-west Atlantic and south-east Pacific in both directions.

Finally, it is encouraging to record that governmental aid has been increased to allow for expansion of staff, that four investigators from overseas have played a considerable part in the work, and that the effort devoted to the problem of fish detection is welcome evidence of increasing collaboration between the physicists and the biologists.

C. H. MORTIMER

THE ROCKEFELLER FOUNDATION

REPORT FOR 1957

THE annual report of the Rockefeller Foundation for 1957, in which appropriations totalled 42,798,916 dollars, including 8,298,260 dollars for medical education and public health, 5,255,235 dollars for biological and medical research, 5,621,400 dollars for the agricultural programme, 3,570,525 dollars for the social sciences and 5 million dollars to the American University of Beirut, stresses the broadening basis of co-operation among governments, with which the work of the Foundation has brought it into close contact at the local level in every continent. For half a century the Rockefeller boards have been intimately involved in the international community of science and scholarship, particularly

in the financial support of scholarship and science abroad, largely through the universities, but using various techniques. Special emphasis is laid on the value of the Foundation's fellowship programme, under which 7,432 men and women from 98 countries, including 1,306 from the United States, have held fellowships for advanced study in 80 countries: of these, 248 received awards in 1957, when 532 persons from 53 countries pursued their training or research in 104 institutions in 20 countries.

Discussing the characteristics of this international community of science and scholarship, the report emphasizes that it is open to all who wish to contribute ideas and its respect is bestowed on the basis

of merit, not of authority. Sweeping beyond national frontiers, the community is linked by a strong network of communication through books, scientific and learned periodicals, meetings, and a persuasive flow of travel and personal correspondence, in which much has been done to remove the barrier of language. Development now involves the fullest participation in this community of science and scholarship and it is suggested accordingly that present tensions underline the need to seek out and cherish those elements of modern life which bind men together across national and cultural frontiers. In the United States alone 66,000 persons participated in educational exchange during the year, 52,000 from 145 countries or territories coming to study or teach, and 14,000 Americans visiting 50 countries for similar tasks. Secondly, governments have demonstrated their ability to set political issues aside at selected points to co-operate effectively for the welfare of their peoples, and if international politics has not yet found practicable means for settling disputes, the field of politics could be reduced by steadily broadening the basis of co-operation on the long-range humane interests of man.

The President's review selects for emphasis the Polish science programme on which in May 1957, following a visit of Foundation representatives to Poland, grants of 300,000 dollars for purchase of scientific materials and supplies, books and periodicals and of 175,000 dollars for fellowships for younger Polish scientists to visit other countries were made. The new grants for Poland are concentrated on medical education, public health, the biological and medical sciences and agriculture, as the Ford Foundation, also at the invitation of the Polish Government, has initiated a programme in social sciences and humanities. Of the 25 fellowships awarded, 19 have already commenced study, most in the United States, but 4 in the United Kingdom, and grants-in-aid were also made to 21 more mature Polish scientists.

In referring again to the public health aspects of nuclear energy, the report suggests that the complicated and difficult problems which will accompany massive use of nuclear energy involve special responsibilities for the universities; the Foundation is accordingly supporting several broad programmes

of special advanced training. That at the New York University Institute of Industrial Medicine stresses the chemical and radiobiological toxicological problems of the nuclear energy industry, particularly quantitative aspects of environmental contamination; at Harvard and at Pittsburgh problems of air-borne chemical and radiobiological contamination are stressed, while at Johns Hopkins University the primary emphasis is in the expanded Department of Biophysics: each of these institutions is receiving 500,000 dollars.

Dealing with the Foundation's operating programmes, the President reviews in some detail its world-wide study of the virus infections transmitted to men and domestic animals by the bite of arthropods. Under it more than 70 distinct viruses have been discovered, 37 of which have been shown to be members of one or other of three immunologically related families, 27 being located in South America, 24 in the Ethiopian region and 15 in the Oriental region, including India, Malaya, the Indonesian Archipelago, Indo-China and South China. He refers to the rapidity with which, in 1957, following the discovery in India of an agent belonging to the Russian tick-borne complex of viruses, the etiology of the disease and its major epidemiological features were elucidated. This shows the utility of the Rockefeller Foundation's virus programme. A special appropriation of 100,000 dollars will assist the Indian Government with its vaccination campaign and enable Indian scientists to study vaccine production techniques in the United States.

Under the agricultural programme, now in its seventeenth year, the Mexican, Columbian, Chilean and Indian agricultural programmes, the last differing from the others in including direct connexion with a graduate school of agriculture and the correlation of the food crop research projects with the research and training activities of the school, will receive support. The Mexican and Columbian programmes have participated in the National Research Council project for preserving indigenous varieties of corn by systematically collecting samples of every extant variety in the High Andean region, Central America and Mexico, while all three Latin American units are co-operating in the international wheat rust nursery of the United States Department of Agriculture.

THE PLANT BREEDING STATION, NJORO, KENYA

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THE new research laboratories of the Plant Breeding Station, Njoro, were opened on August 29, 1958, by the Speaker of the Kenya Legislative Council, Sir Ferdinand Cavendish-Bentinck. He was deputizing for the Minister of Agriculture, the Hon. Michael Blundell, who was unable to be present owing to illness. The ceremony was held in the presence of representatives of agricultural and milling interests, and of a large gathering of farmers from all over the country. After the opening, visitors were shown the field work in progress and conducted through the new laboratories where exhibits had been arranged demonstrating the various problems under investigation.

The building was designed and built by the Ministry of Works, in consultation with the Department of Agriculture, to cater for the special needs of the plant breeding team. The east wing houses the threshing room and cereal-selection laboratory, with space for the storage of sheaf material and packeted seed; special features are the provision of adequate well-lit benching for grain selection, and the arrangement of the layout for ease and efficiency of handling the breeding material. The west wing houses the pathology section, which deals with cereal diseases with special reference to wheat stem rust. The main body of the building consists of the administrative offices, a cereal chemistry laboratory, library, dark