current year, excluding that in the tropics, is of the order of £700,000.

Provision is also to be made for research organized at the level of regional hospital boards, boards of governors and hospital management committees; in this field there is to be the greatest possible freedom from detailed supervision, so that the development of local talent can be fostered.

Research in genetics is not a new activity of the Council. More than twenty years ago it began to develop work in this field. At that time although great progress had been made in the biological study of heredity and in the application of the results of this work to agriculture, human genetics had been neglected and there was need for studies of problems of inheritance and disease in man. This need was later radically increased by developments in the use of nuclear energy. The fact that exposure to radiation could cause fundamental changes in reproductive cells had been known since H. J. Muller first observed it in 1927, but the general increase in the amount of radiation to which individuals and whole communities could be exposed gave rise to the fear that man's hereditary constitution might thereby be permanently endangered, and it was clear that workers must be trained for the study of this general problem.

The Council has therefore established, during the past ten years, a number of research units to follow various lines of investigation of this kind, and observations are being made both on man and on animals. It is expected that expenditure on this kind of work will, in 1960, rise to £100,000 a year. The Council wishes it to be widely known that its scholarships and clinical fellowships provide specialized training in certain genetical methods, and that there are now good opportunities for research careers in university departments, or as members of the Council's staff. In 1955, a committee was appointed to report on the medical aspects of nuclear radiation, including its genetic aspects, and this committee dealt also with the wider problem of the hazards to the community as a whole, or to particular sections of it, which might arise from the use of nuclear and allied radiations. Its report, which was presented to Parliament in 1956 as a White Paper, has now been made available to the United Nations and will be translated into Japanese, German, French and Italian.

The section of the report entitled "Some Aspects of Medical Research" includes, this year, an article on recent advances in the study of the factors that may cause cancer of the lung, an article which reviews the evidence for and against the thesis that tobacco smoke is the only cause. The Council is supporting an expanding programme of research into lung cancer which will study the various possible factors involved, particularly tobacco smoke, and will also test the carcinogenic properties, if any, of substances obtained from the chemical analysis of tobacco and from its combustion.

Other subjects discussed in this part of the report are poliomyelitis vaccination, the prevention of whooping cough by vaccination, filariasis, protein deficiency in man, growth and renal function, microbial genetics, abnormal hæmoglobins and their relation to disease, problems of radiation, the chemistry of proteins and of antibiotics, and the use of the mass spectrometer for gas analysis in respiratory research and clinical practice.

The administration and finance of the Council's multifarious activities are dealt with in other sections of the report which, together with the details of the personnel and many research units and the summaries of their work, afford a clear picture of a great body of scientific work directed to the preservation of health and to the prevention of disease. One is impressed by the vigour of the work in hand, its forward outlook, its breadth and the depth of detail to which it penetrates. It is to this detail and to the Council's flexible control, and most of all to the devoted work of the Council's numerous staff that the results obtained are due. Much of the credit should go to those many members of staff of the Council who cannot, as the report itself points out, make the final contributions, based on their work, which the public, from time to time, acclaims. G. LAPAGE

RESEARCHES IN MARINE BIOLOGY

THE recent issue of the *Journal of the Marine Biological Association of the United Kingdom* (36, No. 2; 1957) contains eighteen papers, of which ten are on work done at Plymouth; three come from Millport, two from Aberdeen, and one each from Oregon State College, Belfast and Burnham-on-Crouch. In addition there are abstracts of fifteen other papers on work done at Plymouth but published in other journals.

The eighteen papers can be roughly divided into five groups: (*a*) botany (1 paper); (*b*) natural history and descriptive zoology (7); (*c*) fish (2); (*d*) physiology and biochemistry (4); (*e*) plankton production and hydrology (4).

(*a*) *Botany*. The single botanical paper is an exhaustive taxonomic study by H. T. Powell of a very variable northern species of *Fucus*, *F. distichus*, the nomenclature of which had reached a state bordering on utter confusion. The main specific characters are the hermaphroditic conceptacles and certain closed cavities in the frond called 'cæcostomata'. There appear to be four principal subspecies, of which one reaches Shetland and one Scotland and Ireland; the species is not known to occur in English waters. From its title, this paper would appear to be the first of a welcome series.

(*b*) *Natural history and descriptive zoology*. There are two papers on copepods associated with other animals.

R. U. Gooding adds a number of new Plymouth records of copepods associated with spatangids, lamellibranchs and fish. Three new species are described, of which one is the type of a new genus.

R. V. Gotto describes the biology of the commensal copepod *Ascidicola rosea* in the very transparent ascidian *Corella parallelogramma* in Strangford Lough, Northern Ireland. The copepod normally lives in the œsophagus of its host, feeding off the mucous food-string as the latter passes by on its way to the ascidian's stomach. The copepod can climb up and down the food-string by means of specialized spiny pads and setæ. Eggs are shed in the ascidian's stomach, pass down the alimentary canal and, conveniently, hatch only on reaching the anus. There is a free-swimming life of about six days, and the host is entered by the second copepodite.

J. Llewellyn describes the larvæ of eleven species of monogenetic trematodes from Plymouth fishes. It is difficult to fit the larvæ so far known (35) into the scheme of classification now in use for the adults, and Llewellyn suggests modifications of the adult

scheme in order to reconcile it with what is shown by the larvæ.

F. S. Russell describes yet another new species of deep-water scyphomedusan (*Atolla vanhöffeni*) brought in by the appropriately named R.V. *Sarsia*.

R. Phillips Dales, investigating the feeding of serpulid and sabellid fan-worms, finds that smaller worms filter relatively faster than larger worms, but that a fan-worm filters more slowly than a lamellibranch or an ascidian of the same weight. Fan-worms seem to depend mainly on inert particles for their subsistence; small flagellates, etc., can escape through the ciliated crown. The polychæte sorting mechanism is relatively crude.

A. J. Southward, continuing his studies on barnacles, investigates the effects of temperature and age on five more species. There is a rough correlation between the range of temperature over which the cirri are active and the geographical range of the species, but this correlation is by no means precise; the world-wide *Lepas anatifera*, for example, is active over a surprisingly narrow temperature-range at Plymouth.

J. E. Morton, A. D. Boney and E. D. S. Corner describe the adaptation of the small, abundant, high-level shore lamellibranch *Lasaea rubra*. Those living higher on the shore are better able to resist desiccation, start feeding sooner after wetting, filter more water in a given time, respire faster and are more tolerant of changes in salinity, than those living farther down the shore.

(*c*) *Fish*. There are two papers by T. B. Bagenal, the first being on the long rough dab (*Hippoglossoides platessoides*) in waters near Millport. The condition of the fish (based on the weight–length ratio) is at a maximum in mid-winter, and at a minimum during the spawning season in March and April, after which it recovers again. In the second paper there is a discussion at some length on the statistics of fecundity in the long rough dab and also in the plaice.

(*d*) *Physiology and biochemistry*. Dorothy Collyer, in an attempt to find causes of the variations in mortality-rate that occur between different batches of oyster larvæ, finds that there is no correlation between size or viability of larvæ and their glycogen content.

There are two more papers by J. A. C. Nicol on luminescence in polynoid worms. Separate elytra, electrically stimulated, can respond by quick flashes (which may be single or multiple) or by a luminescent glow. There is evidence for functional polarity in the nerve cord; to quote Nicol, "luminescent excitation is conducted with greater facility posteriorly over a large part of its length".

D. B. Carlisle, continuing his work on the hormonal inhibition of moulting in decapod Crustacea, examines the 'terminal anecdysis' in crabs. Some species of crabs reach a finite size after which they do not moult again. *Carcinus* moults several times after puberty, but eventually the *X*-organ produces so much moult-inhibiting hormone that further moulting is impossible unless the *X*-organ is removed. In *Maia*, on the other hand, the last moult is at puberty; by that time the *Y*-organ (which produces a moult-promoting hormone) has degenerated, and no more moults are possible even after removal of the *X*-organ. In an interesting appendix Carlisle suggests that the heaps of *Maia* which can sometimes be seen in autumn are a device not only for bringing males and females together for breeding (they can breed only once in a lifetime) but also for protecting the soft, newly moulted females by an outer layer of hard males.

(*e*) *Plankton production and hydrology*. There are two papers by John H. Steele on water samples from the Fladen grounds in the North Sea. In one, on oxygen sampling, a conversion factor for the ratio oxygen–phosphorus is calculated, and problems concerning production and surface exchange are discussed. In the other paper, carbon-14 and phosphate data are compared as means for estimating plant production. The two methods give results which vary in detail but are in general agreement. The carbon-14 method is better for measuring plant production at a particular time, but the phosphate method is better over a period.

Wayne V. Burt reappraises the data of Jones and Wills (1956) on the attenuation of light in the sea, and suggests how they can be used for estimating particle-size.

F. A. J. Armstrong continues his annual surveys of phosphorus and silicon off Plymouth. In general, the hydrographic conditions at International Station *E*1 showed the usual changes. Phosphate, however, was higher in February than at any time since 1929; in spite of a cruise in the western approaches by L. H. N. Cooper, the source of this phosphate-rich water was not discovered. In July and August there was an influx, especially into the deeper layers, of relatively cool water of lower salinity.

JOHN S. COLMAN

A WILSON CLOUD CHAMBER WITH TIME-MARKING OF PARTICLE TRACKS

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IN Wilson cloud chambers using magnetic fields, the momentum of the particles can be determined directly by measuring the curvature of the tracks, but the velocity (energy, mass) only indirectly, from the observation of recoil electrons, ionization density and other observations. It would therefore be desirable to possess an instrument which puts time marks on the tracks, at equal intervals of the order of 10^{-10} sec., to allow a direct measurement of velocities. One of us (D. G.) has proposed achieving this by turning the Wilson cloud chamber into a resonating microwave cavity, which operates with an almost uniform high-frequency field so near to breakdown that considerable multiplication of secondary electrons takes place near every peak, producing a periodic thickening of the tracks. This would also make possible the observation of emission delays of the order 10^{-11} to 10^{-10} sec. in nuclear events.

A high-frequency field near the breakdown limit supplies to electrons energies such that an appreciable fraction will create at least one further pair during their life-time. But if the life-time is long, as in inert