their assessment of radiation hazards. This is only in part due to our lack of knowledge concerning the number of mutations which a given dose of radiation produces in man; in fact, the estimates of this quantity vary surprisingly little between scientists in Britain and in the United States. The main causes of divergent opinions are the personal attitudes to two problems: one temporal and the other numerical. The temporal: how large is our responsibility towards future, still unborn, generations of mankind? The numerical: granted that a certain dose of radiation is sure to cause the death of a few thousand babies in the next generation, do we need to worry about this when these deaths, for which we carry the responsibility, form only a very small proportion of 'natural' deaths? The answers to these questions cannot be dictated by the scientist; they have to be given by everyone according to his reason and moral standards. All the scientist can do is to put the facts before the public, and this has been done most ably in Dr. Weaver's lecture.

C. AUERBACH

[1] Auerbach, C., *Nature*, **178**, 453 (1956).

INSTITUTE OF PHYSICS

REPORT FOR 1956

THE thirty-seventh annual report of the Board of the Institute of Physics covering the work of the Institute during 1956 was presented to the annual general meeting of the Institute, which was held on July 12 at Oxford during the Institute's third convention. During the year under review the Board met six times and its various standing committees ten times. The membership and examinations committee dealt with 752 applications for election or transfer to the various grades of membership, and the interviews panel met three times and interviewed eleven candidates. Representatives of the committee visited four technical colleges which had applied for recognition by the Institute. The committee is now also responsible for giving advice on educational matters, and two panels have been set up—one to consider the revision of the lists of recognized qualifications for membership, and the other to submit a report to the Board on suggested means of stimulating entry to the profession of physics.

The total membership of the Institute rose during 1956 by 385 to 5,531, with the greatest increase in the associateship (203) and the graduateship (104) grades of membership. The graduateship examination was held during June 11–15, and written papers were taken both at the Institute's rooms in London and at three provincial centres. Seven of the forty-five candidates who presented themselves for examination satisfied the examiners. For the final examinations for National Certificates in Applied Physics the numbers of candidates were 424 for the ordinary level and 152 for the higher certificate, compared with 309 and 82, respectively, in 1955. The Board agreed to accept the diploma in physics of the Northern Polytechnic, London, as giving complete exemption from the Institute's academic requirements for graduateship membership. Five such diplomas had been accepted during 1955, three of which were to be awarded on satisfactory completion of sandwich courses. In co-operation with the London and Home Counties Regional Advisory Council for Higher Technological Education a conference on "Degree and Diploma Courses in Applied Physics" was arranged and held at the Institution of Electrical Engineers, London, during November 15–16. More than half the 160 who attended were senior representatives of industry or government service. The proceedings of the conference, including the discussion, have since been published, both in the Institute's *Bulletin* (8, 47, 86, 119, 166; 1957), and separately in booklet form. ("The Education of Physicists in Universities and Colleges of Technology": Institute of Physics, London. 1957. 6*s*.)

The increase in circulation of the Institute's two journals, *The Journal of Scientific Instruments* and *The British Journal of Applied Physics*, to libraries and non-members was about double that of the past few years, and the effect on the circulation of the new requirement that members pay for their own copies was less than anticipated. The revenue from advertisements showed a satisfactory increase. Details of the numbers of contributions submitted and published, together with the extents of the journals, are given in the annual report. The average delay between the first receipt and publication of a manuscript remained about six months. Supplement No. 5 of *The British Journal of Applied Physics*, containing the proceedings of the conference on "The Physics of Nuclear Reactors", held in London during July 3–6, was published in November.

The *Bulletin*, which has been expanded and presented in an entirely new and improved format during 1956, is now the only periodical of the Institute to which all members are entitled without extra payment, and its development is considered by the Board as an important part of the publication policy of the Institute. The twelve monthly issues comprised 344 pages containing twenty-three articles; news of the activities of the Institute's branches and groups; thirty-six book reviews; and the titles and abstracts of the principal contents of the Institute's two journals.

The Institute continues to be represented on many joint bodies and committees, including the Parliamentary and Scientific Committee, committees of the Royal Society and the British Standards Institution, and several national, regional and other scientific and technological advisory councils. Extracts from the reports of the Institute's representatives are given in the annual report. The number and nature of the inquiries addressed to the Institute concerning professional matters were much the same as in previous years. A fourth in the annual series of surveys of salaries and emoluments of members of the Institute was made in October and a report on the survey was published in the January issue of the *Bulletin* (8, 19; 1957). The annual inquiry concerning the type of posts taken up by new graduates in physics was extended in the case of 1955 graduates to include those with M.Sc. and Ph.D. degrees. A similar inquiry is being made in respect of 1956 and 1957 graduates, and it is hoped to publish a report, with comments, which will cover the results of these inquiries.

Details of the activities of the specialist groups and of the branches of the Institute, both home and overseas, are listed in the report. The Australian branch consists of 419 members and separate divisions in the various states of the Commonwealth. Under the auspices of the New South Wales division a conference on contemporary optics was held in Sydney

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during September 19–21 (*J. Sci. Instr.*, 34, 129; 1957). The inaugural meeting of the Malayan branch was held in Singapore on May 9 when Mr. C. G. Webb was elected chairman and Dr. Thong Saw Pak honorary secretary. The Liverpool and North Wales branch held a two-day symposium in Bangor during September 26–27 on the subject of nuclear magnetic resonance, at which it was decided to form a Radiofrequency Spectroscopy Group of the Institute to cover all branches of spectroscopy up to about 10^{11} c./s. The programme of the London and Home Counties branch included a joint symposium with the Royal Institute of Chemistry and the Institute of Biology on the presentation of science to the public, and visits to the National Institute for Medical Research, the Research Laboratory of Associated Electrical Industries, Ltd., at Aldermaston, and the Royal Naval College and the National Maritime Museum at Greenwich. A one-day conference on physics in industry was held in Cardiff by the South Wales branch at which Sir John Cockcroft gave a public address on "The Future of Science and Technology in Industry" (*Bulletin*, 7, 147; 1956). Joint meetings were held between the Education Group and the Manchester and District branch, and between the X-ray Analysis Group and the Low Temperature Group of the Physical Society; a symposium on thin films was held by the Electronics Group in Reading; and the summer meeting of the Non-Destructive Testing Group took the form of a symposium in Bristol on the physics of some new aspects of non-destructive testing, the contributions to which have since been published (*Brit. J. App. Phys.*, 8, Suppl. No. 6; 1957).

At the general meeting of the Institute, the following were elected to take office on October 1: *President*, Mr. O. W. Humphreys; *Vice-President*, Prof. E. C. Stoner; *Honorary Treasurer*, Dr. J. Taylor; *Honorary Secretary*, Prof. F. A. Vick.

S. WEINTROUB

WALL DEPOSITION IN *CHAETOMORPHA MELAGONIUM* (CLADOPHORALES)

By DR. E. NICOLAI

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THE morphological complexity of the structure of the walls in several members of the Cladophorales attracted the attention of botanists as early as the middle of the past century, at a time when the light microscope was the only tool available. Since that time, the application of the more modern methods of X-ray diffraction analysis and electron microscopy has confirmed the older results and amplified them by adding structural details formerly beyond the limits of investigation. It is now known[1] that the walls of all the members of the Cladophorales—except the genera *Acrosiphonia* and *Spongomorpha*—are built up of many lamellæ each consisting of strictly parallel microfibrils imbedded in an amorphous matrix. The direction of these microfibrils changes from layer to layer through an angle of about 90°, so that by and large in every other layer the microfibrils are running in the same direction[2]. This structure, the 'cross-striation pattern', had been foreshadowed in the light-microscope observations of two sets of fine striations visible in surface view of the walls, reflecting exactly the directions of the two sets of underlying microfibrils[3]. Approximately the same structure occurs in the walls of *Valonia* where, however, a third direction of orientation is present, though the corresponding microfibrils are less abundant than are those in the two major directions[4]. In the filamentous Cladophoraceae, one of the sets of striations (and therefore one set of microfibrils) is approximately parallel and the other one perpendicular to the longitudinal axis of the cells.

X-ray analysis has shown that the microfibrils in the above-mentioned cases consist of highly crystalline cellulose I [2] and in *Valonia* this has been confirmed by electron diffraction analysis[5].

It is clear that any ideas on the genesis of this crossed fibrillar structure are best based on observations of walls recently formed at a previously naked cytoplasmic surface. The swarmers and the developing sporelings of members of the Cladophorales obviously offer suitable material on which critical observations might be made, and the present article concerns the data obtained about the first wall laid down and the stage of development at which the cross-striation pattern makes its appearance.

Two marine members of the Cladophorales were chosen because of the ease and reliability with which they form motile stages in quantity. One of them will be discussed here, *Chaetomorpha melagonium*. The unbranched filaments of this plant were collected on the Northumbrian coast, near the Dove Marine Laboratory in Cullercoats. The motile stages of reproduction can be either gametes, the fusion of which gives a zygote which in turn develops into a new plant, or zoospores which sprout without fusion. During the months of January and February, filaments brought from the coast, kept overnight in a refrigerator at about 2° C. and then returned to room temperature in the light, produced large numbers of motile cells. Many of the large cells of the filaments were emptied in the formation of about 8μ-long swarmers, each bearing two flagella. The presence of two flagella and the emptying of whole filaments both in the laboratory and on the shore suggests, on the basis of Hartmann's work[6], that these are gametes, though only very rarely could a beginning of fusion be observed. These swarmers, nevertheless, can be induced to settle and germinate. They keep moving for several hours and collect towards the light. Though they settle readily on solid substrates, it proved to be difficult to find a transparent medium on which they sprout and develop. The best results were reached with silica plates covered with sea water. On this substrate settling and sprouting of

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