PHYSICAL SOCIETY

REPORT FOR 1952

AT the annual general meeting of the Physical Society, held at the Imperial College of Science and Technology, London, on May 15, the reports of the council and of the honorary treasurer and the accounts and balance sheet for 1952 were presented and adopted, and the officers and council for 1953–54 were elected (see *Nature*, May 30, p. 958). At the extraordinary general meeting held immediately after the annual general meeting, new articles of association and new rules of the Society, as approved by the Board of Trade, were finally approved and adopted. During 1952 the membership of the Society rose to 2,101—a net increase of seventy-six. The total income from subscriptions was £5,231; but this was less than the cost, £5,799, of providing the membership with the normal amenities and privileges. The new scheme of subscriptions, approved in principle in 1951, was adopted at an extraordinary general meeting held on October 3, 1952, and came into operation on January 1 this year. Under this scheme subscriptions for publications are separated from the subscriptions for membership, and thus the cost, £2,569, of providing members with *Physics Abstracts* during 1952 appears as an expense for the last time. In future the Society should be able to extend the amenities given to its Fellows. The thirty-sixth annual exhibition of scientific instruments and apparatus, held during April 3–8, 1952, was a great success with an attendance of thirteen thousand and resulted in a benefit to the Society of £4,000. This enabled the Society to finish the year with a balance of income over expenditure of approximately £2,500.

Eight science meetings were held in London during the year and two-day meetings at, respectively, the H. H. Wills Physical Laboratories, University of Bristol, at the University of Glasgow and at the Physical Laboratories, University of Manchester. The thirty-sixth Guthrie Lecture[1] was delivered by Sir Lawrence Bragg, who spoke on the X-ray analysis of proteins, and the sixth Rutherford Lecture[2] by Prof. R. E. Peierls, on the atomic nucleus and its constituents. Prof. L. Néel was the recipient of the seventh Holweck Medal of the Société Française de Physique and the Holweck Prize of the Physical Society; the presentation took place at the Royal Institution on May 27, when Prof. Néel delivered the Holweck Discourse[3] on the subject of antiferromagnetism and ferrimagnetism. The twenty-ninth Duddell Medal was presented to Mr. C. Waller, who gave a talk on some topics concerning the production and application of nuclear emulsions, and the eighth Charles Vernon Boys Prize to Dr. B. Bleaney, who spoke on paramagnetic resonance at low temperatures.

The Society continues to be represented on various joint committees and bodies, details of which are listed in the annual report, together with accounts of the activities of the four Groups of the Society, the Colour, Optical, Low Temperature and Acoustic Groups. In addition to science meetings, the Colour Group paid a summer visit to Cambridge, and the Low Temperature Group held its second overseas meeting early in November, when a party of twenty-four members visited laboratories and industrial plants in Holland.

The Society's Library has in the past been the joint responsibility of the Society and of the Institute of Physics, but the Board of the Institute has recently suggested that the Library would be better administered by the Society alone. It has presented to the Society all books and journals of the Institute at present in the Library and is continuing to pass on to the Library periodicals received in exchange for the Institute journals. The grant received during the year from the Royal Society for the development of the Library has been used mainly for cataloguing and for increasing the shelf space. This has been largely facilitated by the acquisition of a large council chamber at the Society's headquarters. A complete card-index to both text-books and periodicals is now available.

The average time of publication of papers in the Society's *Proceedings* has improved, so the report states, from five and a half months in 1951 to slightly less than five months in 1952, with the hope of still greater improvement in the near future. Both Sections *A* and *B* of the *Proceedings* contained about 115 papers each, but there were about twice as many "Letters to the Editor" in Section *A* as in *B*. The referees are again praised for their valuable services in keeping a careful check on the papers submitted for publication and for maintaining a high standard in content, style and composition. Of 295 papers and 141 letters submitted, approximately seventy were rejected as unsuitable for publication. Vol. 15 of "Reports on Progress in Physics", containing nine reports and a cumulative index of authors and contents of Vols. 1–15, was published during 1952, and Vol. 16 and a comprehensive cumulative subject index to Vols. 1–10 are in active preparation for publication this year.

[1] *Proc. Phys. Soc.*, B, **65**, 833 (1952).
[2] *Proc. Phys. Soc.*, A, **66**, 313 (1953).
[3] *Proc. Phys. Soc.*, A, **65**, 869 (1952).

INTERNATIONAL CO-OPERATION IN SCIENCE

THE report of a symposium on development of international co-operation in science held at Washington on October 18, 1951, in conjunction with the third annual meeting of the Executive Board of the International Council of Scientific Unions, has been issued by the National Academy of Sciences and the National Research Council (Development of International Cooperation in Science: a Symposium held in conjunction with the Third Annual Meeting of the Executive Board, International Council of Scientific Unions, October 18, 1951, Washington, D.C. Pp. 28. (Washington, D.C.: National Academy of Sciences/National Research Council, 1952)). It includes Prof. F. J. M. Stratton's brief review of the development of international co-operation in science during the past century down to the formation of the United Nations Educational, Scientific and Cultural Organization, and comments on the necessity which now confronts the Council and the Unions of either curtailing their activities or increasing their incomes; and the review of some international scientific joint ventures, for example, in publications, international surveys and laboratories, exchanges of scientists and the co-operative use of natural resources, made by Dr. W. A. Noyes, jun., in which he indicated some of the difficulties and the necessity of an open-minded approach to the problems, is also published.

Dr. J. N. Mukherjee described the attitude of Asia and the Far East, and Dr. C. J. Mackenzie, in putting

the Canadian point of view, referred to the importance of ensuring that representatives on the various bodies are chosen by scientists who are competent and knowledgeable about the work being done in all parts of the world. He believes that the existing organization is as good as any likely to be devised, provided the support of really first-class men is obtained and any moribund or inefficient parts that might develop in the organization are discarded. Dr. J. B. Koepfli's address, "Science and Foreign Relations", described the events leading to the creation in February 1951 of the Office of Science Adviser to the United States Department of State, and the way in which the activities of the Office are assisting international co-operation in science and encouraging international scientific organizations. The two main difficulties in its work, he thinks, are the administrative delays in the admission of foreign scientists into the United States and the legislative ceiling to the United States support of the International Council and the Scientific Unions. Scientists, he suggested, can help to overcome both these obstacles by fostering among themselves a fuller understanding of the United States' objectives and immigration laws, and by making the plans and work of the Council and its Unions more widely and fully known.

The address by Prof. A. von Muralt on international and national aspects of science directed attention to the importance of finding new ways of maintaining the atmosphere in which scientific development is best fostered, including new ways for arranging scientific congresses in view of the numbers attending, and new techniques for handling the dissemination and co-ordination of knowledge. While not over-rating the influence of scientific men, he believes that their efforts at international co-operation in science can contribute notably towards a wider understanding between all countries.

PHYSICAL APPLICATIONS OF HIGH-SPEED ROTATION

THE substance of a lecture entitled "Some Scientific Applications of High-Speed Rotation", delivered by Prof. P. B. Moon on April 27, 1951, to the South Wales Branch of the Institute of Physics, is printed as a special article in the *British Journal of Applied Physics* (4, 97; April 1953). First, brief reference is made to the familiar classical examples such as those to be found in the measurement of the velocity of light, the molecular pump and the centrifuge, and to the fundamental researches of Oliver Lodge (1897), where an attempt was made to 'drag' the ether by rotating disks, and of Blackett (1952), where the test was made, though unsuccessfully, to detect the magnetic field produced by a massive body rotating with the earth. The principles of rotor design are then discussed, and the best shape of rotor for attaining the highest practicable linear velocity at the periphery is considered. It is pointed out that, while the ideal shape is independent of the material and of the size, it is governed by the criterion of equal stress at all parts of the rotor. For a thin rod spinning about an axis perpendicular to its length, the ideal shape is that of a Gauss error-curve, and for a disk-like rotor the disk should be thin at the edge and the profile that of the Gauss error-function.

The various methods that have been used for driving rotors and their particular advantages and applications are next discussed. A detailed description is given of the particular method[1] introduced recently at the University of Birmingham, which Prof. Moon claims is nearly as simple as that of Colwell and Hall and nearly as effective as that of Beams. The rotor used consists of a doubly tapered steel rod with a small ball of hardened steel at its base. The ball runs on a glass plate, and an electromagnet suspended by a short thread to act as a conical pendulum supports and takes up about 90 per cent of the weight of the rotor. Peripheral speeds of up to 10^5 cm./sec. have been attained with a six-inch rotor. Various examples of such rotors are shown diagrammatically, and it is explained how the method has been applied at Birmingham to the production of high-speed beams of heavy atoms and molecules.

Rotating shutters for neutrons is the main application of rotational technique in the field of nuclear physics. Sectored disks of cadmium, which is highly opaque to very slow neutrons, were first used by Dunning and co-workers in 1935, but recent developments at the University of Chicago, as explained by Prof. Moon, have produced a 'sandwich' type of shutter composed of alternate layers of cadmium and aluminium enclosed in a strong steel shell which serves for the interruption of faster neutrons. Another shutter of this type consists of a slotted steel shaft rotating in front of a similar, coaxial, but fixed, shaft.

Finally, Prof. Moon's own particular application[2] of high-speed rotation in the field of nuclear physics is briefly described. A strong radioactive gold source of low mass is carried on the tip of a high-speed rotor, and by virtue of the Doppler effect sufficient energy is restored to the gamma radiation to produce resonant nuclear scattering in liquid mercury (10 per cent mercury-198).

[1] *J. Sci. Instr.*, **25**, 348 (1948).
[2] *Proc. Phys. Soc.*, A, **64**, 76 (1951).

THE MUTATION THEORY OF EVOLUTION

WHILE the majority of biologists agree that evolution proceeds by mutation and natural selection, Prof. L. P. Martin, of McGill University, suggests that the mutation–selection theory is not wholly convincing as a means of explaining natural evolution (*Amer. Sci.*, **41**, No. 1; January 1953). This dissent is not so much due to a failure to master the facts as to the grasp of some facts which Martin believes geneticists are apt to overlook.

None of the facts, nor all of them together, establishes the mutation–selection theory beyond all doubt.

Among the difficulties raised by Martin and his fellow recusants is that, though the occurrence of mutations in both wild and domestic populations is clearly established and though they are important in the genesis of our domestic breeds of animals and plants, even giving rise to some disease-resisting strains, yet all mutations seem to be in the nature of injuries which, to some extent, impair the fertility and viability of the affected organisms. The impaired stamina of present-day domestic breeds is shown by their inability to survive in natural conditions, except in exceptional and sheltered environments. Resistance to disease conferred by some mutations seems to be