

Physics", jointly with the Royal Meteorological Society, during January 4-5; "Semiconductors", in conjunction with British Thomson-Houston Research Laboratories, during April 10-12; "The Physics of Gas Flow at Very High Speeds", at the University of Manchester, during July 16-17; and " β - and γ -Ray Spectroscopy and Related Topics", at the University of Edinburgh, during December 17-19. It is planned to hold six or seven conferences annually. The arrangement to hold joint colloquia on electron physics open to members of the Institute of Physics and of the Society was continued, and two meetings were held. The annual Fellows' luncheon, which was attended by about one hundred Fellows, was again held on the opening day of the annual exhibition of scientific instruments and apparatus. The fortieth Guthrie Lecture was delivered by (the late) Sir Francis Simon, who gave a historical survey of the third law of thermodynamics, and the eighth Rutherford Lecture by Prof. P. I. Dee, who spoke on the alpha particle.

Prof. J.-P. Mathieu was the recipient of the eleventh Holweck Medal of the Société Française de Physique and the Holweck Prize of the Physical Society; after the presentation, which took place in London, Prof. Mathieu delivered the Holweck discourse on the subject of crystalline structures. Prof. J. G. Daunt (Ohio State University) received the thirty-third Duddell Medal and for his address discussed the magnetic refrigerator for temperatures below 1° K. (now published in *Proc. Phys. Soc.*, B, 70, 641; 1957). The twelfth Charles Vernon Boys Prize was presented to Prof. G. D. Rochester and Dr. C. C. Butler in recognition of their work on the discovery of the charged and uncharged *V*-particles.

During 1956, the Council states, there was a slight increase in the total membership, from 1,978 to 1,999. There was an overall surplus for the year of just over £1,000, indicating the healthy condition of the Society's finances, and this is emphasized by the balance sheet, which shows that the Society's investments, apart from special funds, total more than £20,000. Expenditure on behalf of the members exceeded income by about £700, and on general activities, consisting mainly of publications and science meetings, the Society incurred a loss of nearly £1,200 in spite of a generous grant of £1,500 from the Royal Society. However, as in former years, the annual exhibition of scientific instruments and apparatus, through the success in sales of the handbook to the exhibition, brought in a revenue which more than counterbalanced the losses. Both halls of the Royal Horticultural Society were used for housing the exhibition. The number of exhibitors was substantially the same as in previous years and the attendance was again large—more than 16,000.

Greatly increased interest in the Society's publications during the year is reported. The sale of the current numbers of both the *Proceedings of the Physical Society* and the "Reports on Progress in Physics" has risen, and there has been a large increase in the sale of earlier volumes of the "Reports" and of some of the Society's special reports, particularly the 1954 Bristol conference report on "Defects in Crystalline Solids" and the 1954 Cambridge conference report on the "Physics of the Ionosphere". A serious delay because of printing troubles in the publication of the *Proceedings* during the earlier part of the year has since been made up. Two hundred papers and 111 research notes and letters were accepted for publication; 45 were rejected or withdrawn by the authors. Vol. 19 of

the "Reports", containing nine specialist articles, was issued during the summer and separate copies of the individual articles were again available for purchase.

Details of the activities of the four Groups of the Society, the Colour, Optical, Low Temperature and Acoustics Groups, together with a list of the numerous bodies on which the Society is represented, are given in the annual report. In addition to science meetings, the Optical Group held its summer meeting at the University of Exeter; the Low Temperature Group held an all-day discussion meeting on the subject of liquid helium, and a two-day joint conference with the X-ray Analysis Group of the Institute of Physics at the Clarendon Laboratory, Oxford, on the subject of X-rays and low-temperature crystallography, and visited the Low Temperature Laboratories of the Royal Radar Research Establishment, Great Malvern; and the Acoustics Group included in its programme a symposium on loudspeakers and a distinguished visitor's address by Dr. W. E. Kock.

The officers and council for 1957-58 are as follows: *President*, Prof. N. F. Mott; *Vice-Presidents* (in addition to those who have filled the office of president), Prof. S. Devons, Prof. F. Llewellyn Jones, Prof. H. Jones and Dr. K. Mendelsohn; *Honorary Secretaries*, Dr. C. G. Wynne and Dr. H. H. Hopkins; *Honorary Foreign Secretary*, Prof. E. N. da C. Andrade; *Honorary Treasurer*, Mr. A. J. Philpot; *Honorary Librarian*, Dr. R. W. B. Pearse; *New Ordinary Members of Council*, Dr. B. H. Flowers, Prof. M. H. L. Pryce and Mr. E. W. H. Selwyn.

WATER POLLUTION RESEARCH

THIS review of the report of the Water Pollution Research Board for 1956* could start with a frequently quoted verse from Gray's "Elegy" about gems and flowers, though some might find odd the juxtaposition of any thought from that poem and sewage. The point is that this publication is of a kind liable to be ignored by most not directly concerned with pollution on the grounds that it is of interest only to those who are, which is not true. The reviewer deems it his function to show where and why this is not true even if, in dwelling on those pieces of research that will command interest outside the applied field, he gives an unbalanced picture of the work of the Laboratory.

The concentration of oxygen is one of the important factors affecting freshwater organisms, but one of which the significance is very hard to assess because it often fluctuates considerably and often reaches critical values at the most inconvenient times of day. Any method of recording it continuously will be welcomed by many concerned with both theoretical and applied problems; the Water Pollution Research Laboratory has devised two. The first required mains electricity which limited its range rather seriously. The second, referred to in the report under review, can be operated from batteries.

The results of what must clearly have been an extensive series of trials are summarized in a table which shows at three temperatures the highest concentration of oxygen at which all fish died in a week and the lowest at which all survived for a week. Most oxygen was required at the highest temperatures,

* Department of Scientific and Industrial Research. Water Pollution Research 1956: the Report of the Water Pollution Research Board with the Report of the Director of the Water Pollution Research Laboratory. Pp. iv+75+4 plates. (London: H.M. Stationery Office 1957.) 4s. net.

and rainbow trout generally needed more than any of seven species of coarse fish tested, which is just what anyone would have foretold. Other results are more unexpected; for example, trout survived for a week at a temperature of 20° C. when the concentration of oxygen was only 29.6 per cent of saturation, and the most exigent species at this temperature was mirror carp, which required 58.9 per cent. Another surprise is the smallness of the difference between the two figures; at 20° C. the oxygen concentration had only to drop to 28.2 per cent of saturation and no trout survived for a week. There is much in this table for physiologists, ecologists and those charged with the care of fishing waters.

The aerating effect of weirs has been studied, and it has even been possible to find a formula for it.

The rest of the report will interest mainly those directly concerned with pollution problems. An extensive survey of the Thames estuary has been made to discover the amount of oxygen that combines with polluting matter and the amount taken by the water from the air, together with the influence of temperature, rate of flow and tidal phenomena on these two processes. The hope was that it might be possible to find general principles from which the effect of the last three on the first two could be predicted. An observer knowing the rate of flow, the temperature, and the state of the tides, which are easily measured, could then say how much polluting matter could be discharged into the stream without causing total oxygen deficiency and nuisance anywhere. The hope has been fulfilled.

Uptake of oxygen is reduced by synthetic detergents, though the effect diminishes as the concentration of sewage rises. Cetyl alcohol, which is being added to reservoirs in certain parts of the world to see whether it will reduce evaporation, also depresses the rate of oxygen uptake. Substances added to prevent foaming in activated sludge plants do not.

Work on oxygen has been the main preoccupation at the laboratory, experience having shown that the best policy is to keep the field of effort narrow, but much else has been accomplished as well. The toxicity of various substances to fish has been investigated. That of synthetic detergents is reduced by the activated sludge process. Ammonia occurs frequently in polluted waters and, in those charged with sewage, may be the main killing agent beyond the zone where lack of oxygen is acute. Concentrations of 10–15 parts per million N ammonia affect fish survival considerably. It occurs, too, in effluents resulting from the washing of coke oven gas together with phenol, which is less toxic. The effect of the two substances is complementary, and the toxicity can be calculated when the proportion of the two is known.

When the new Laboratory was being planned, a site to which large amounts of domestic sewage could be supplied was chosen. Research making use of this facility is following two lines: the elucidation of the fundamental nature of certain processes that are still largely empirical in operation; and methods of treating different kinds of effluent. To the first category belongs a study of the structure of the biological film of a percolating filter and of factors which modify it; the reviewer wonders whether much progress will be made with this until more precise names than 'zoogloal bacteria', 'nematodes' and 'protozoa' can be given to the organisms involved. What exactly happens during the activated sludge process is another thing that the staff intend to find out.

T. T. MACAN

TASTE AND SMELL

THE senses of taste and smell from the physiological and psychological points of view formed the subject of one of the periodical discussion meetings at the Society for Visiting Scientists, London, on May 21. The degree of attention paid during the general discussion to psychological rather than to physiological factors might be held to indicate that, in certain circumstances at least, the scientist was just as interested in his own subjective psychological processes as in the pursuit of objective data. Dr. H. Kalmus (University College, London), one of the three opening speakers, began by sketching-in some of the anatomical and physiological background of the receptor organs for taste and smell and then went on to describe some of his own work and that of his associates in this field. Following up the earlier discovery that phenylthiourea tastes bitter to some people but is apparently tasteless to others, and that this varying power of perception was hereditary, Harris and Kalmus had shown that this simple genetical difference applies, in fact, to a large group of substances containing the CNS group but to no others. In a second line of work, using a series of feeding experiments with two hives of bees and two different food sources, in which use was made of the dancing motions of bees as a method of information transference, Kalmus, together with C. R. Ribbands, had succeeded in confirming von Frisch's discovery that the bees were able to distinguish the taste of bees from their own hive from that of those from the other hive. In this case, however, the power of distinction was not hereditary. Dr. Kalmus had also worked on the power of odour perception in dogs. He had demonstrated that a dog which had been given the scent of a man's hands could successfully recover a handkerchief scented in the man's armpit from a number of other handkerchiefs scattered about the room, and could trace the man across a field in the open air from the scent left on a handkerchief when the trail was confused by a number of other men. In trials indoors with identical twins the wrong twin might be followed instead of the right one, though in the open air there was some indication that the right twin might be followed in preference. The most interesting point here seemed to be that the dog could recognize a man from his armpit odour (on the handkerchief), having previously been given only the hand odour, whereas to a human being there seemed to be more resemblance between two different armpit odours than between the hand and armpit odours of the same individual. This seemed to indicate a different and perhaps altogether higher power of integration in the dog; Mr. B. Babington Smith used the illuminating analogy of a musician who might recognize that two sounds apparently different to a non-musical ear were in fact merely octaves of the same note.

Mr. Babington Smith (Institute of Experimental Psychology, Oxford), the second speaker, described some work on non-expert consumer preference panels composed of undergraduates, in which he had been interested rather in the methodology and in the reactions of his subjects than in the actual results of the tests. The tests were confined to simple paired comparisons on red wine and chocolate, though Mr. Babington Smith did not stress the actual results beyond rather mischievously suggesting that there was some indication that the more intelligent people preferred plain to milk chocolate. The incidental