

It is satisfactory to note that a number of visiting research workers went to Millport during the year, and that there are general signs of increasing post-war activity. The Millport Laboratory is situated in an area with much sheltered water and an abundant flora and fauna. It is most suitably placed for research of many kinds, and is within easy reach of deeper oceanic water with its rich and varied fauna. It is to be hoped, therefore, that in order to cope with the increasing demands for marine biological research in the British Isles we shall see in the near future an expansion of the staff and equipment at Millport. Included with the equipment should be a larger research vessel in order that the range of observations at sea may be extended.

MANAGEMENT OF RESEARCH

THE lecture on "The Organisation of Industrial Research" which Dr. R. P. Russell, president of the Standard Oil Development Co., delivered on June 9 to the Industrial Research Committee of the Federation of British Industries was far more than a factual review of one of the world's largest research organisations or its achievements in the petroleum industry: it was a masterly analysis of factors and conditions determining the success of industrial research in any field and an outstanding contribution to what may be termed the philosophy of research. Research activity in his own Company, he said, began in 1919 with a group of twenty-six people: to-day the staff includes 2,456 technologists, engineers, assistants and clerical personnel all engaged exclusively on research and development projects, as well as several hundred working on laboratory phases of direct operating problems and an engineering staff of more than five hundred. Dr. Russell computed that this expansion had brought a return of £15,400 of additional profit for each £1,000 expended on research and development, and he believes that without research and development any company or industry would stagnate and in time lose most of its business to more far-sighted competitors.

Dr. Russell does not, however, claim that research is a universal panacea or even that it is the keystone in the arch of industrial production. It is rather one link in a chain which comprises also natural and human resources, production management, effective sales and distribution and courageous executive management. Nor is the 'economic climate' alone important: a sound 'political climate' is also an important factor in successful industrial enterprise, for such a climate inspires the sense of security which gives people confidence to assume the risks involved in any important new venture. These factors are all important and must be firmly interlinked if our objectives of satisfying human needs are to be achieved. Progress depends essentially on whether our political and economic system strengthens or weakens the factors which form the links in the industrial chain.

At the outset, Dr. Russell disposes of the idea that adequate expenditure of money or of men on research is all that is required. It is a matter of team-work and co-operation and of ensuring the conditions most favourable to the generation of ideas. Effective co-operation, for example, in the solution of a research or development problem means that everyone participating knows the problems which exist and recognizes their relative importance. This applies

no less to the engineering organisation, the production group and management than to the research and development team itself, and the first point which Dr. Russell makes is that information about a project on which the research organisation is engaged must flow freely throughout the whole organisation, horizontally as well as vertically. Insulation of the research and development department must be avoided at all cost, and continuing contacts fostered at each operating level.

The interlacing of information in this way is not only a valuable incentive but also has certain practical advantages in facilitating the rapid application to one project of new knowledge gained by other units. Nor is the exchange of information confined within the firm. Dr. Russell stresses the value of close contact with work going on outside, of attendance at scientific and technical meetings and of the use of consultants as well as research agreements with universities, sometimes on very broad lines and sometimes for specific problems of immediate importance. Here Dr. Russell makes no distinction between fundamental and fact-finding research, and the value of the universities as the centre of the search for knowledge for its own sake is rather taken for granted. Expenditure of his Company on research by outside consultants amounts to about two per cent, and on research grants to universities to more than three per cent, of the total salaries of the technical and professional staff. Apart from this, research workers are encouraged to devote about ten per cent of their time to work on original ideas; and while the value of competition as a stimulus is fully appreciated and encouraged within the firm itself, the practice is never allowed to impede the free and complete flow of all information from unit to unit.

Dr. Russell indicates clearly the relations of mutual trust which exist in the research organisation he describes, and that positive factor is one the importance of which can scarcely be exaggerated. In itself it fosters the sense of individual responsibility which calls forth the maximum ingenuity and initiative; and in establishing the right atmosphere it probably contributes even more than the study of individual characteristics and capabilities, though that, too, is important. No less important than encouraging the generation of ideas is the avoiding of practices which tend to discourage them, and some of the observations Dr. Russell makes here are substantiated by bitter experience in Great Britain between the two World Wars. As he truly remarks, the loss of morale and effectiveness through a sudden and drastic reduction of the technical staff is out of all proportion to the monetary saving achieved.

There is much in this lecture for those responsible for the management of research to ponder, all the more in that Dr. Russell recognizes that, in the United States as in the United Kingdom for some years to come, the available scientific man-power will be insufficient to meet all the demands for trained staff, and it will be imperative to ensure that the best possible use is made of the resources that are available. Nor is it a matter for the industrialist alone. It is not necessary to go all the way with Dr. Russell in his belief in the necessity for a free and truly competitive system to agree with him that political conditions can be of great importance from the point of view of incentives. The idea of public service, as Sir Oliver Franks noted in his recent lectures, can be at least as satisfying an incentive as the purely financial one.