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SCIENTIFIC RESEARCH AND INDUSTRIAL DEVELOPMENT

THERE are various ways in which science can be brought to influence industrial development—by direct contact between private firms and university scientists, by the work in Government-sponsored laboratories or by the research associations of industrial groups themselves. While it is desirable that scientists in the universities should act as advisers to industrial concerns, the universities should mainly be concerned with fundamental research. Similarly, one of the functions of the Government laboratories would be to explore the possibilities of industrial application of our natural products, while the further adaptation of these processes to large scale manufacture and problems arising from them should properly be studied in the research laboratories of industrial firms themselves.

Unfortunately, there seems to be little recognition of the necessity for research in many of the industrial concerns in our country to-day. Apparently, this complacency on the part of our industrialists is not entirely absent even in a much more advanced country like Great Britain. In his book entitled "The Neglect of

Science",* Professor F. E. Simon of the University of Oxford, draws attention to the backwardness of British Industry in this respect compared to other countries like Switzerland and the United States of America.

Analysing the causes of Britain's industrial backwardness, Professor Simon traces it rightly to the lack of higher technological education of the level attained for instance in the Technische Hochschule at Zurich or the Institutes of Technology at Massachusetts or California. Emphasizing the indispensable rôle played by engineer-scientists as liaison between the fields of fundamental research and industry, he deplures the fact that the technical education of creative engineers and applied scientists is at present mainly left to the rather small engineering departments attached to the universities. "While these may be suitable for the education of technicians—though even in this respect they do not compare too favourably with their opposite numbers abroad—they are wholly unsuitable for

* *The Neglect of Science—Essays Addressed to Laymen* by F. E. Simon, F. R. S., Basil Blackwell, Oxford, 1951.

educating engineers of the type with which we are concerned here. Hardly any of these colleges carry out any research worth the name, and this alone is enough to show that they cannot have people on their teaching staff really able to supply proper training in the subjects." This may be compared with the original statement regarding the four years' under-graduate course in science at the California Institute of Technology, which says: "Its purpose will be to provide a college education which, when followed by one or more years of graduate study, will best train the creative type of scientist or engineer so urgently needed in our educational, Governmental and industrial development.... In all the departments of the Institute, research is strongly emphasized, not only because of the importance of contributing to the advancement of science, but because research work adds vitality to the educational work of the Institute and develops originality and creativeness in its students".

In the light of the above, it is to be earnestly hoped that at least the newly established Institutes of Technology would strive to maintain such a standard of instruction and devote themselves to the training of engineer-scientists, who would play a notable part in the industrial progress of our country. However, one has to realize, as Prof. Simon says, that "it is not enough to create such an organization; it must also have the full support of industry. Unfortunately, one gets the impression that many industrialists are not fully awake to this point. This is perhaps due to the fact that on the boards of our companies we have no proper representation of scientists or engineers".

Besides taking early steps to reform the technological education in this country on the lines indicated above, it is eminently desirable, if only as an act of enlightened self-interest of long range utility, that our industrialists should create endowments of the nature of the Rock-

feller Foundation and the Carnegie Institution, where fundamental research can be carried out without much disturbance. In the words of Prof. Simon, "Since people and Government are very often interested only in the fairly near future, the question of giving adequate support to fundamental research has hardly ever received the attention it deserves, and the general public in particular, knows little about what is to be done".

We believe that there is a great opportunity here for private enterprise, which should not be lost sight of. This is especially to be desired because official bodies, however broad-minded, have a tendency to lay the stress on particular fields of research, with consequent detriment to all the other branches in which scientists may specially be interested. Also, there can be no greater stultifying influence upon pure research than the feeling that *results* are awaited by someone. It is easy enough to get plenty of results by choosing a suitable field—but this is not how progress is made in science.

Finally, some people may ask why, when fundamental research published in one country benefits industrial development all over the world, is it necessary to have fundamental research in all the countries? Why not leave it—especially in times of financial stress—to the richer countries?

Such a negative attitude, it is needless to point out, would be disastrous for any country which adopted it. Quite apart from the question of providing satisfactory education for the practical or applied scientists, we must remember that the scientific community is a living one with an equilibrium between different types of people and different types of research. It is, therefore, impossible to neglect the fundamental aspects of research without seriously affecting the onward march of science, on which industrial development ultimately depends.

NOBEL PRIZE FOR MEDICINE—1951

DR. MAX THEILER, who has been awarded the Nobel Prize for Medicine this year, was born in S. Africa in 1899. After his training in the London School of Tropical Medicine he worked at Harvard, in the Department of Tropical Medicine. It was there that he developed his work on the susceptibility of white mice to intra-cerebral inoculation of

yellow fever virus. Later, Dr. Theiler moved to the International Division of the Rockefeller Foundation, New York, where he made the discovery of the innocuous nature of 17D sub-culture of the Asibi strain of yellow fever. This strain is widely used for immunizing against yellow fever.
