

THE NATIONAL PHYSICAL LABORATORY OF INDIA, DELHI*

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THE GENESIS

[IN the year 1941, the Director of Scientific and Industrial Research represented to the then Commerce Member, Sir Ramaswamy Mudaliar, who was also the founder of the Council of Scientific and Industrial Research, that the prime essential for India's industrial development was a Central Research Laboratory, separating as it developed into a National Chemical and a National Physical Laboratory. Already the Government had provided us with a laboratory at the Government Test House in Calcutta to make a beginning in the matter of organising scientific and industrial research in the country to meet national and defence needs necessitated by the war. I proposed in a note both an expansion of the Government Test House and the creation of new laboratories in Calcutta, Delhi or other places climatically more suited. These proposals were still under examination when the entry of Japan into the war changed the situation completely and it became clear that any expansion of activity at Calcutta was out of the question, since Calcutta was obviously vulnerable to air attack. So, it was decided to remove the laboratories of the Director of Scientific and Industrial Research to Delhi and continue the work of the Board at the headquarters of the Government.

The idea of establishing a twin-set of laboratories, the National Physical Laboratory and the National Chemical Laboratory, was accepted in the beginning of 1943 by the then formed Council of Scientific and Industrial Research. Soon after, the idea was widened in scope and the Council approached the Government of India for the grant of a crore of rupees for the post-war establishment of five National Laboratories, the three additional ones being, a National Metallurgical Laboratory, a Central Glass and Ceramic Research Institute and a Fuel Research Institute. Planning Committees consisting of some of the best available scientific and technical talent in the country were set up to prepare broad plans for the work, functions and organisation of each of these laboratories.

It is necessary to stress here the nature of the National Laboratories. These laboratories do not intend to supplant but to supplement the work of individual or collective industrial concerns in respect of research. They undertake work of the kind that does not come ordinarily under the scope of industries. Since they are able to command resources wider than the industries can, the laboratories can employ more talent and try alternative approaches to problems simultaneously. Problems which bear wider social aspects than an industry could be

concerned which become subjects of state scientific research. Moreover, the advice that state research can give will be non-partisan. Industry can hardly undertake work of a purely exploratory nature. So the function of these laboratories is both complementary and independent.

THE PLANNING COMMITTEE

The Planning Committee for the National Physical Laboratory consisted of Sir Ghulam Mohammad as Chairman and as members, Prof. M. N. Saha, Dr. Nazir Ahmad, Sir K. S. Krishnan, Principal G. R. Paranjpe, Dr. H. J. Bhabha, Dr. Wali Mohammad, Dr. D. M. Bose, Dr. Rafi Mohammad Chaudhry and Mr. N. N. Sen Gupta and myself. Besides these members, the Council obtained the services of Dr. K. N. Mathur from the University of Lucknow as Assistant Director for planning and as Secretary to the Committee. Following the usual procedure of the Council's Planning Committee Reports, the National Physical Laboratory Report was first drawn up in a tentative form and was widely circulated, to invite comments and suggestions, both in India and abroad. The response the Committee received could, perhaps, be taken as an index of the general interest in the Laboratory. Besides a volume of comments and suggestions from individual scientists, scientific institutions and Government Departments in India, we had the benefit of the advice of the President of the California Institute of Technology, Prof. Robert A. Millikan, the Director of the National Bureau of Standards, Dr. Lyman Briggs and the Director of the National Physical Laboratory (of England), Sir Charles Darwin. In England, the National Physical Laboratory, situated in the picturesque surroundings of the Bushy Park has established an envied reputation for itself. Its tests and certificates are taken as the hall-mark of the highest precision and accuracy which scientific knowledge and human ingenuity can attain. As members of the Scientific Mission which visited U.K. and U.S.A. in 1945 some of us had the privilege of a free discussion with Sir Charles Darwin and members of his staff on the tentative proposals for the National Physical Laboratory. This discussion and the suggestions received, enabled the Planning Committee to finalise their report which was published early this year and was accepted by the Governing Body of the Council.

ORGANISATION AND FUNCTION OF THE NATIONAL PHYSICAL LABORATORY

In the main, the Laboratory's foremost function will be the maintenance of fundamental and derived standards, and the undertaking of research with a view to achieve greater and greater accuracy in the measurement of these standards. At present there is no well-equipped laboratory in India which can undertake standards work. One or two laboratories in

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India possess yard and metre bars which were at one time standardised by the National Physical Laboratory at Teddington. The Mint at Bombay have in their possession certain standard weights certified by the National Physical Laboratory of England. But in neither case any systematic organisation exists to undertake regularly inter-comparisons between their standards and those of the other countries, which is the accepted method of all standards laboratories. Besides the fundamental standards of length, mass and time, there is a large number of derived standards like volume which comes in so much in chemical glassware, and in gallon measures of liquids; the various electrical units against which all the electrical measuring work of the scientists, the electrical industry and the electric supply companies is standardized; density measurements, which are of use not only to the scientists but also to the layman. The Lactometer interests the housewife as a handy weapon in her constant travail against the quantity of water in domestic milk supply. Perhaps, one of the biggest contributions which the National Physical Laboratory in England made under the able direction of Sir Charles Darwin was their organisation for testing gauges for the industry during the war time. We are on the threshold of a great industrial development in the country in which the development of engineering industry is expected to play a very great part. No precision work in engineering can be done without an adequate supply of calibrated gauges, and some organised laboratory where these gauges could be checked and rechecked periodically since gauges wear off with use. This point may be better appreciated if I were to say that in the fittings of high grade automobiles and aero-engines an accuracy better than one part in ten thousand is usually required in individual parts. At the National Physical Laboratory at Teddington, gauges are tested to an accuracy of better than one part in a million. In the calibration of the standard weights they have reached an accuracy of one part in ten million through the use of a special type of balance and accurate control of outer conditions.

NINE DIVISIONS

The work of the laboratory in India will be carried on through the following nine Divisions:—

- (1) Weights and Measures.
- (2) Applied Mechanics and Materials.
- (3) Heat and Power.
- (4) Optics.
- (5) Electricity.
- (6) Electronics and Sound.
- (7) Building and Housing Research.
- (8) Hydraulic Research.
- (9) Analytical Chemistry.

Each of these divisions will be under an Assistant Director, who will have under him scientific assistants besides other laboratory staff.

LIAISON WITH INDUSTRY

Apart from the work of standardisation the laboratory will be called upon to undertake considerable amount of research work which is expected to go a long way towards developing

Industry in this country. Physical science is taking long and fast stride. New discoveries in the fundamental sciences are opening up vast possibilities of industrial application both by way of improving old processes and by introducing new ones. The National Physical Laboratory will be concerned with maintaining constant research work to fulfil this purpose. For the same reason they will maintain a close liaison with Industry. Investigation of raw materials of the country with a view to adopt them to the requirements of the industry will be a correlative work which the laboratory will undertake.

INDUSTRIAL STANDARDISATION

A very important aspect to which sufficient attention has not been given in this country is that of industrial standardisation. It may be recalled that the Government of India recently set up a body known as Indian Standards Institution, which will undertake industrial standardization in India on somewhat the same lines as the British Standards Institution does in the U.K. The work of the B.S.I. is carried on mainly through the active assistance of scientific laboratories. The National Physical Laboratory in England has contributed not a little towards the success of industrial standardisation there in all branches which lie within the scope of their work. The Council of Scientific and Industrial Research have been associated intimately with the formation of the Indian Standards Institution and Dr. Mathur recently represented them at the British Commonwealth Standards Conference and the International Conference on Standardisation, held in London in October last. At both these conferences, measures for a better co-ordination of industrial standardisation were discussed. If India is to play her role as a great nation she has to take an active part in scientific and technological work of an international character quite as much as in the international political sphere. Speaking from experience, I can say without hesitation that the amount of unanimity which the scientists are able to achieve is quite unimaginable amongst politicians. The National Physical Laboratory Planning Committee has rightly laid great stress on the point that the Laboratory shall in all possible ways assist Industrial Standardisation.

FUNDAMENTAL vs. APPLIED RESEARCH

The subject of fundamental versus applied research has been recently heard in many quarters. In the minds of those qualified to speak research can hardly be divided into water-tight compartments and such division is a scholastic distinction which ignores how scientific research develops. What is fundamental to-day, may become very much of applied research in a very short while. The electrical dynamo was as much the result of fundamental work on the nature of electricity as the development of atomic energy the result of abstract calculations of the nuclear physicists. Both the theoretical and practical aspects of science have thus progressed by their intimate interplay. An artificial separation is neither theoretically sound nor practically workable and if enforced renders theory arid and practice a petrified routine. It is by the inter-pollination