

## SIR M. VISVESVARAYA ON APPLIED RESEARCH IN RELATION TO INDUSTRIAL DEVELOPMENT AND POST-WAR RECONSTRUCTION

ADDRESSING the Sixth Annual Meeting of the Court of the Indian Institute of Science, Sir M. Visvesvaraya, the President of the Court, re-emphasised the fact that the Institute was founded in order that its activities might be devoted to securing for India the material benefits expected to follow from the close association of scientific research with the industries of the country. He added. "Such was also the primary object for which this Court was established. I trust it is permissible to hope that in future the new Court will devote two or three days of its time at each annual session for enquiring into, and discussing, the affairs of the Institute and for reviewing the progress made in science and research both at this Institute and in other institutions in the country. By doing so, they will be not only setting a healthy precedent but will also be serving the interests of science and industry in the country as a whole."

Reviewing the progress achieved during the preceding quinquennium, Sir M. Visvesvaraya remarked, "a casual examination of the annual reports of the previous years will disclose the fact that industrial research which was the main purpose for which the Institute was established had been allowed to fall into background. How this came about is explained in my previous addresses. A Joint-Committee of the Council and the Court was constituted in March 1940 to suggest measures to give industrial research its proper place in the scheme of things, and some of the suggestions recommended by that Committee are now being slowly given effect to. It has been found difficult to make rapid changes because the funds available are limited and it has not been practicable to divert the money already earmarked for other useful objects. Steps are being taken to follow a consistent policy in future and to strengthen the industrial research side of the work until at least half the regular expenditure of the Institute is separately devoted to it.

"The Quinquennial Reviewing Committee which functioned in 1936 was the last of its kind. The Committee due in 1941 was not appointed on account of the war. I believe there is no necessity for appoint-

ing any more reviewing committees. A better plan in future would be to depute one or two professors to foreign countries as often as funds permit to study world progress in the subjects in which training is given in the Institute. The reviewing committees did useful work when the Institute was still young but the men who conceived the idea and shaped the original plan could not have intended that the Institute should remain in leading strings for all time.

"The budget estimates of income and expenditure which were presented to the Court at its first meeting in March 1938-39 were likely to amount to Rs. 6,00,354 and Rs. 6,05,868, respectively. The corresponding figures of income and expenditure in the revised estimates for the year 1942-43 are Rs. 9,55,017 and Rs. 11,30,105. The opening balance in the former budget stood at Rs. 5,34,373 and in the latter Rs. 4,70,413. The reduction of about Rs. 64,000 was due to the increased cost of apparatus and materials in war time and also to the extra sums that had to be spent on applied research in order to obviate the cutting down of other useful collateral activities that had sprung up. Several new schemes have been initiated, income has grown, and expenditure on work done during the lifetime of the last Court has increased by more than 80 per cent. All this is a distinct sign of prudent administration and progress."

He then referred to the higher types of technological instruction which was being recently imparted at the Institute. "The first of these developments was a course in chemical engineering, started in 1940-41, in which systematic instruction is being imparted. Equipment of considerable value required for this section has already been secured, and the syllabus is being constantly improved and brought up to date. This development was necessary to give preliminary training to students coming fresh from the laboratories of theoretical sciences before they embark on industrial research. I understand that the course has been quite popular with the freshmen admitted to the several departments of Chemistry,



"A second development is the course newly started from January 1943 for post-graduate training in Aeronautical Engineering. This is the first scheme of its kind in India. The Government of India have sanctioned a capital grant of Rs. 1,25,000 for the construction of a Wind Tunnel and the accessory laboratories, and a recurring grant of Rs. 41,800 for the salary of the staff and working expenses. These grants have been supplemented by a capital grant of Rs. 1 lakh from the funds of the Institute for equipping the laboratories. The aeronautical engineering industry has a great future before it and there is every prospect that the graduates who have chosen this post-graduate course will not lack profitable employment.

"Our thanks are due to Sir John Higgins, Mr. W. D. Pawley and Mr. L. C. McCarty for the valuable work they have rendered to the Institute in the planning and equipment for this course. Sir John Higgins, the Chairman of the Board of Directors of the Hindustan Aircraft, Limited, in a message to the *Factory Gazette* for February 1943 gives a very hopeful account of the progress of the local factory. He is of opinion that the work of the employees of the Company has now a scope far beyond the original aims set before them and he goes on to add: 'I look forward confidently to the time when this factory will compare favourably with the best aircraft factories in America or England.'

"It may be of interest to mention in this connection that Mr. W. D. Pawley, the American expert of the Bangalore Aircraft Company, has offered a scholarship of \$3,000 a year for four years to students of this Institute, tenable at an American institution for higher studies in aeronautical engineering."

Continuing he said, "another important departure from routine developments is the projected establishment of a chair of Applied Mechanics and Automobile Engineering together with the nucleus of a research laboratory for the work of the professor to be appointed. This is due to the munificence of the Government of Mysore who have given the Institute a capital grant of Rs. 1 lakh and a recurring grant of Rs. 15,000. Provision is made in the budget for 1943-44 for starting work on this course.

"I brought to notice last year that the

Institute did not possess the facilities of staff necessary to help large-scale or key industries. It is equipped to a certain extent for work in chemical industries but even in that sphere facilities for large-scale chemical industries are lacking. Both the Pope Committee and the Sewell Committee have recommended that the creation of a mechanical engineering laboratory should constitute the very first item in the Institute. The war that is going on is a mechanical engineers' war and if this Institute is to be of material help for war effort or for safeguarding the defences of the country, a department of Applied Mechanics should be started, Applied Research should be materially strengthened, and a research workshop added to form an integral part of both."

Discussing the present deficiencies and wants of the Institute, Sir M. Visvesvaraya said, "This Institute has not yet cultivated sufficiently closer relations with heavy industries so far, and no attempt has been made to establish Research Fellowships for heavy industries.

"Information and data pertaining to the leading key industries are being collected in the office of the Institute but the progress seems to be slow. It will be slow until an officer of the grade of an Assistant Professor is made definitely responsible for developing this activity.

"In last year's session of this Court, I pleaded for the setting up of a large engineering workshop and laboratory in order that the Institute may be able to handle satisfactorily many of the important problems that arise from time to time in mechanical engineering, electrical engineering, and heavy chemical industries. This will require substantial grants both capital and recurring; say, a capital grant of Rs. 10 lakhs and a recurring one of Rs. 2 lakhs. It is hoped that the Government of India will find the necessary funds. Help in this respect may be also available from the Indian States and the leading industrialists in the country. Not until adequate provision is made for the efficient engineering workshop and laboratory, can the Institute be said to have become a real home of industrial research.

"It is hoped that the policies and aims of the Institute will be clearly defined and a plan of work for the next five years determined by the Governing Council under the



advice of the Joint-Committee already referred to.

"Oftentimes, work in the field of pure research is of a routine character. This type of pure research is better left to institutions which are not so well equipped as this Institute is. Work in this Institute should be concentrated, mainly, though not altogether, on two or three specific objects, namely, technological instruction of the highest grades, research in heavy industries whether newly projected or already in operation, and theoretical research of a fundamental character.

"Since science is advancing very fast, closer co-ordination of duties between the members of the staff and orderly development of work on a plan in all the departments are *sine qua non*.

"If all the above-named deficiencies and wants are to receive prompt attention and the original intentions of the Founder faithfully given effect to, the best course would be to appoint a Committee of three members including the Director to watch the interests of the Institute on behalf of the Governing Council and keep the latter correctly posted in matters which it should know in order to exercise effective supervision and control. Each member of this Committee, other than the Director, may hold office for a couple of years and one of the two members may be elected every year jointly by the Council and the Court. The two members should be paid an honorarium or fee to ensure disciplined adherence to regulations on their part. This Committee of three should be of the nature of a specialised staff charged with the duty of keeping a watch on the progress of science and research both within and outside the country, of keeping an eye at the same time on the day-to-day needs of the Institute, and of continuously submitting proposals and programmes for improvement and reform as required. Since the Council meets only three times a year, a change of this kind seems absolutely necessary in order to do away with the hesitations, delays and mistakes of the past. This is one of the principal measures needed to make the Institute a self-governing and self-improving institution."

In the course of the address he outlined the activities of the Board of Scientific and Industrial Research. He said: "On 2nd April 1940, the Government of India an-

nounced the establishment of the present Board of Scientific and Industrial Research. The creation of this Board was a happy move. It was expected that thereafter there would be a satisfactory co-ordination of work between the pure science research worker, the industrial scientist and the industrialists throughout the country. At commencement the services of research workers were utilised only for war work and the industries entrusted to the Board were all of a minor character. I understand that in recent months research in, and manufacture of, heavy chemicals are being encouraged, but the co-ordination of research work which is going on in all parts of the country, and which was considered important three years ago, has not yet been brought about.

"The Director of Scientific and Industrial Research and some of the members of the Board are scientists of acknowledged capacity and initiative. Some of the Committees appointed seem to have taken a serious view of their responsibilities and passed resolutions in favour of practical action in connection with the following among other industries:—

Internal combustion engines, Fuel research, Metallurgical industries, Dye-stuffs, Glass and refractory materials, and Manufacture of Industrial plants.

"Government have so far not shown much inclination to encourage the establishment of any of these industries. On the other hand it is understood that instructions have been issued to the Committees to confine their attention to the technical aspects of their problems and not to express views regarding administrative support or action, such as, protection, subsidies, etc., needed to establish the industries.

"I understand that another important resolution has been passed by the Council of Scientific and Industrial Research recommending the establishment of four research laboratories on an all-India basis, namely, a national chemical laboratory, a national physical laboratory, a fuel research laboratory and a metallurgical laboratory. It is hoped that preparations will be set on foot and necessary funds provided to give effect to this resolution.

"The latest move by the Council of Scientific and Industrial Research is the compilation and publication of a Dictionary of Raw Materials of India, embodying all



available knowledge of such materials. This is doubtless a satisfactory step, although a more urgent compilation, and a more useful one, needed is the collection and compilation of industrial statistics. In the absence of statistical measurement, it is feared Government themselves have no precise knowledge of the true industrial situation in the country."

Concluding Sir M. Visvesvaraya added, "The provision newly made for technological instruction of the higher grades is a notable event in the history of the Institute. Industrial research is also making some progress but it is yet far from what it should be. It is hoped the demand for more rapid progress will be recognised and that adequate provision will be made therefor in the proposed five-year plan which is at present under the active consideration of the Council.

"As regards research in India as a whole, it is satisfactory to learn that the Council of Scientific and Industrial Research has done some work for the war. But the co-ordination of research activities in all parts of the country which was to be one of its principal functions has not received much attention. At first only small industries and minor chemicals were allowed to be handled; latterly, however, heavy chemicals are also coming into favour. Discoveries and inventions are opening up a New Era of Engineering but there is no sign that research in relation to heavy engineering industries is making any progress at all in India outside the purely military establishments.

"I have had occasion from another platform to bring to notice the restrictions and limitations to which heavy industries have been subjected in India as compared with the phenomenal developments that have taken place in countries like Canada and Australia during this war. Till recently research was also treated in the same restrictive spirit. We have seen that several important recommendations made by the committees of the Council of Scientific and Industrial Research in favour of heavy industries, like the internal combustion engine, have not been accepted or even noted by Government. It cannot be said that an industry to manufacture internal combustion engines is not a vital necessity in any country or that it is not needed in India, I understand, however, that private

establishments are attempting its manufacture with some success.

"It must be recognised that many industrialists and tradesmen have profited by the business done in textiles, raw and semi-raw materials and other war supplies, but it is a recognised economic axiom that *production of goods and services for war do not contribute to a country's economic welfare.*

"There is too much secrecy; no intelligent exposition of policies is available particularly in regard to industries. No official in high position ever gives a comprehensive interpretation of the views of Government, what they propose to do and why their policies and procedure are so different from those followed in any progressive country or even in the self-governing dominions of the British Commonwealth. There is no directory for war work or for civilian industries. Whatever attempts are made are fragmentary. The Governments of countries like Australia, Belgium, Russia and Czecho-Slovakia have set up offices in India to carry on their propaganda in this country. They issue News-Sheets regularly to acquaint Indians with what they are doing in their respective countries, whereas we do not get to know what our Government are doing in our own country. No stock-taking is done here, no review is attempted, of the industrial and economic affairs of the 390 millions of the population of India.

"As regards post-war reconstruction, although a beginning was announced and a Committee and Sub-Committees were appointed so far back as October 1941, no reports of those Committees have seen the light. What work the Committees did, whether they did any work at all is not stated. When the Committees began work, industries were excluded from their purview. All these are unusual practices under any Government. Such trends discourage enterprise and even preparations for post-war work. The appointment of a new set of Committees for post-war reconstruction has been announced within the past few days but that is also of the traditional type. No clear statement is made of the aims, or economic policies Government have in view.

"Contrast this attitude with these two statements picked out at random from the latest News-Sheet—*Astral News* for March 1943—just published in Calcutta:



Mr. Makin, Munitions Minister, said 'that Australian industry had been revolutionised to provide the maximum war effort.'

Dr. H. V. Evatt, another Minister, stated: 'Post-war reconstruction like the war task will consist in assuring that the country's economic resources are fully employed. They must be directed primarily for purposes which is Australia's obligation to achieve: namely, economic security and rising standards for all . . . . Preparations in this respect will not retard but assist 'the war effort.'

"I am not pointing to any casual mistakes or omissions which in times of crisis like this are inevitable, but am referring to policies which seem deliberate and which threaten to cause permanent injury to the interests of our vast Indian population.

"I have had to refer to industries on this

occasion because the main object of this Institute is to promote industries by means of research and there is a close interdependence between industries and research. It is needless to state that industrial research will have no value or importance if industries themselves are neglected or starved. Since at the present time, Government have taken control of almost every activity in the country, they owe a duty to the public to explain their policies and justify their inaction in respect of these three developments, namely, industries, industrial research for peace-time needs, and post-war reconstruction—as compared with what is happening under other Governments in the British Commonwealth. In the absence of such a statement, the future which India has to face, when the time for post-war reconstruction arrives, will be viewed by many thinking persons in this country with anxiety and apprehension."

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## DAIRY INDUSTRY AND ITS FUTURE

BY

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THE value of annual contribution of the bovine population to Indian economic wealth has been assessed at a colossal figure of one thousand crores of rupees. Of these, at least one-third is due directly to milk and milk products. Cattle maintenance is thus of great importance to India. It supplies not only a vast deficiency in our nutritional requirements but it is closely connected with the national economy. In spite of its magnitude, the present state of the dairy industry in India is rather sad. It is still steeped in orthodox sentiments, no attempt being made to fit in with the changing times and conditions. It is one of the most unorganised industries of the country and is carried out on individualistic basis. It is only a fortunate coincidence that the Indian populace is subconsciously aware of the nutritional importance of milk and its products.

In the past, on many an occasion human-made catastrophes have proved blessings in disguise. For example, it required the last Great War to teach the English farmers the

benefits of properly organising their dairy industry and since then the development has been tremendous. In most of our urban centres, the situation is almost parallel to that existing in England at the time and considering the high prices the farm products fetch at present due to the war, it is to be hoped that this will provide a suitable opportunity for organising the dairy industry of this country on which a wider structure could be built later.

The prime function of the dairy industry is to produce enough milk to satisfy the needs of the country. The present production can at least be increased six-fold to achieve this end. This increase in milk market should no doubt bring in its train a better living standard for those engaged in this industry. Increase in production of milk is closely linked up with the number of the cattle population. India is in a paradoxical position that it has more cattle than it needs. India possesses about a third of the total cattle population of the world, yet the annual output of milk is hardly