

Science and the Community*

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I MUST begin by expressing two things that are upmost in my mind at this moment: the thanks we all owe to Mr. Radford Mather, the generous founder of these lectures, and the honour I feel at having been asked by the Council of the British Association to deliver the first of them. Mr. Radford Mather has been impressed by the importance of the work of the scientist in the ordinary everyday life of our people, especially at this moment; and, after a long life enlivened by scientific and social interest, he feels keenly that a recognition of that work is not only owing to the scientific worker himself, but also will be helpful in inducing the public to use the advantages which the scientist has put at its disposal.

The history of scientific discovery and the application of scientific knowledge to human activities in every field reads like a romance, and I can imagine no more interesting career for anyone whose tastes lie in that direction. The interest and importance of the scientific career, however, are not confined to the laboratory or the classroom, but should be regarded as a major, if indeed not the major, creative influence on this generation. In national economic well-being, especially in making high standards of living possible, in the evolution of both the powers and forms of national institutions, in the efforts to create and secure social harmony and co-operation, the scientific method, if followed, would be of great assistance and would save some futile experiments, mistaken agitation and unworkable proposals. Thus, the politician as well as the professor, the housewife as well as the manager of great works, whether they are aware of it or not, depend in the performance of their work upon whether the public mind not only responds emotionally but also sets about making that response with the same care as to facts and the same anxiety as to methods as the man of science shows in his special field. What are called 'moving' descriptions of human ills, quite accurate as to facts but left without carefully studied conclusions as to treatment, often become serious obstacles in the way of satisfactory remedies.

In all public affairs I myself am an unrepentant evolutionist. There must be changes, not for the sake of change, but because social harmony and progress require it. Were it not so, civilization itself would soon become a relic, and we should have to deal with a society which has breathed its last progressive breath and has reached the stage

of disruption through evolution, because it is not adapting itself to the new conditions which are the immediate offspring of its own life. Civilization is not a static state but one of dynamic activity which requires direction. The most lasting and fruitful of changes are those which arise from the failures of existing conditions or their hitherto imperfect successes. Or we may put it this way in full accordance with the truly scientific mind: Creation was left imperfect for man to carry it on towards completion by coming to understand it, both as an accomplishment and a promise. The place where the shoe pinches either body or mind is the spot where disruptive unsettlement shows itself first. The remedy is not to curse the shoe nor to content ourselves by describing the pains. The shoe should be adapted so that it may be useful (as it was intended to be) without doing what it was never meant to do—rack us with pain.

Pain in the individual corresponds with discomfort and unrest in the community. Both are signals of harmful processes and call for study and treatment in the scientific spirit, in order to prevent more serious results—serious illness and death in the individual, revolution and disruption in the community.

By the scientific method it might often be possible to prevent even the pain and unrest. This optimism in progress, however, assumes that an awakened interest in the work of the experimental scientist will incline the public to follow, in its own special concerns, the methods and spirit of the scientist himself. I make no plea for the scientist as statesman. He will not be likely to be any better than Plato's philosopher. The plea I make is for a practical democracy, but if democracy is to triumph in the attack now being made upon it, it must have a method, and I believe that the records of the scientific worker and the way he sets about his work will steady and clarify the popular mind not only to complain eloquently, but also to conclude wisely.

In these days, when science is renewing its claims to be regarded as an essential part of cultural education and to rank in value with the humanities for that purpose, it must be able to show that its pursuit is not only to discover facts, but to influence values of life as well, and that it can not only put power into men's hands, but also quicken the human qualities of mind which take care that that power is used for human well-being

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and progress. The scientist as citizen should take a lively concern in the way his discoveries are used. Prof. Lancelot Hogben contributed a thought-provoking paper to the Blackpool meeting in which he emphasized this dictum: "The cultural claims of science rest on the social fact that the use and misuse of science immediately affects the everyday life of every citizen in a modern community."

If at the end of a generation the great contribution that scientific activity has made to the life of the community is to produce a power of destruction which can be used to appal the most indifferent to human suffering and injustice, the labours of the scientist of our time run the risk of being permanently deplored. This is now being widely recognized by scientists themselves. On the other hand, the part which our present scientific research can play in social well-being and solidarity depends upon an enlightened popular view of the value and significance of those researches and their uses.

Standards of life have undoubtedly been raised and opportunities for improving wages provided, whilst leisure has been extended and the conditions under which people work, even in spite of some serious shortcomings, greatly improved. Human stress and strain have become considerations in work, and the adaptability of the individual to employment has greatly eased the discomforts and disappointments of the worker. These tendencies have by no means exhausted themselves, and an enlightened determination to maintain the conditions of uninterrupted consumption of products by increasing the share of the worker will minimize the hardships of any at-present-uncontrollable slackening in the market demands for production and labour.

The needs dealt with by these scientific investigations cover an extraordinarily wide field indicated with interesting clarity in the annual reports of the Department of Scientific and Industrial Research and its organizations, such as the National Physical Laboratory. From these it is seen that organized research extends apace, and that the co-operation between scientists and industrialists has become a well-marked feature in our industrial life. Industry is no longer satisfied with sporadic consultations with science. This has led, as the last annual report of the Department of Scientific and Industrial Research records, to a steady improvement of the efficiency of our industry and the comforts of the working staffs.

Furthermore, there is a steady growth of the acceptance of scientific effort on the part of industrialists, and a spirit of co-operation between the scientist and industrialist has been developed to an encouraging degree, so much so that we may well say that we have been witnessing the creation

and development of a new industrial organ with a well-marked function.

I must limit my excursion into those fields to which modern scientific discoveries are leading us, which have been so interestingly dealt with in papers read at the Blackpool meeting of the British Association last year, and which find a voice in some most challenging articles in recent issues of the scientific press. Nor will scientists fail to observe the meaning of that most significant resolution passed by the recent Trade Union Congress agreeing to a Committee of Scientists with whom Congress can consult on policy, outlook and methods of handling their special work. Thus a scientific front is being created, with the co-operation of all classes and interests, to encourage scientific inquiry and to use it to promote communal well-being.

The advance in the investigations of the scientist is not, however, universally welcomed. The reason is that science and machinery mean pretty much the same thing in the public mind, and two accusations are made against machinery which are in very many minds as they see what wonderful things science has done in recent years. The first expresses a general doubt whether this machine age has brought us any benefit at all, and is anything more than an unfortunate by-road in world history. It is argued that, in pursuing the machine, man has lost his soul and those qualities which proved that he had a soul. That great question in aesthetics cannot be dealt with in this lecture even as a side issue. I believe that a very large part of the case for it is based upon the misuse of science for which the man of science has nothing to do, and cannot be blamed. But, further than that, I am not at all sure but that science will be found to provide the antidote—conditions of leisure and culture which will enable us to rediscover the qualities of life which modern society is said to have lost.

In many quarters science is regarded as the enemy of human beings who desire to live as self-supporting workers. So has it always been at times of great change in industrial production. A reply which reminds us of the experiences of labour in history, that the displacement of men by machinery has always been but temporary and that with an increase in national wealth we also have an increase in the national demand for labour. There is some evidence that that experience is being repeated to-day. It is, however, rather unconvincing to the man who actually finds himself unemployed because a machine more efficient than himself as a producer has taken his place in mine and factory. Be that as it may, machinery which takes the place of the hard, uninspiring and deadening drudgery of human

beings is all to the good, and that which multiplies the efficiency of human skill is also all to the good. Human safeguards and benefits come from other directions—mainly from an increase in leisure, the enjoyment and use of which are amongst the most pressing of social problems to-day. And there is another pressing problem in front of us. How to reduce cost of production without lowering standards of life? Scientific invention properly used, I believe, will give us a chance to solve both problems.

The other trouble is kept fresh and urgent by what we read every day in our newspapers of the great advance due to science in the destructive forces of the world, as shown in China and Spain, and will be repeated with increased horror wherever war breaks out. If we cannot avoid war, we cannot avoid the very worst that can happen in warfare. But this raises issues which depend upon other considerations than those of the field of science. Science increases power which can be applied both to life and death. The men who have made air forces possible, for example, have also created civil air fleets, and if the communities cannot make and keep peace, or if they are so blind as to follow the aggressive actions of their rulers, democratic or dictatorial, the consequences are theirs. If peace is not secured by, say, diplomacy and the will not of one but of all nations, it is both a false judgment and a cowardly one to blame the scientific engineer and worker. The action of the farmer in growing corn and food for war is exactly of the same kind as the engineer who makes flying engines. Peace or war is not the responsibility of scientists *as scientists*, except in very special cases, so long (and it will always be) as the discoveries which increase our peaceful and beneficial resources can be used for war machinery.

At the same time, there is a feeling amongst many scientists that the ease by which their labours may be misused in this way should make them, as citizens, sharers in creating and upholding the public opinion of the nations to which they belong, interested in protecting their work from being outrageously abused as beneficial poisons can be.

I have presided over various international conferences of chemists, engineers and others interested in this question, and one and all gave a hearty response to every mention of this interest and duty of theirs. Scientists will also remember that from that distinguished scientific body, the Royal Academy of Sciences at Amsterdam, came a resolution which after discussion at the general assembly of the International Council of Scientific Unions, in April last, led to the appointment of a committee with the following terms of reference:

“The Committee, at suitable intervals, should prepare a survey of the most important results obtained and of the directions of progress that are

opening and of points of view brought forward in the physical, chemical and biological sciences, with reference to:—

“(1) their interconnections and the development of the scientific picture of the world in general;“(2) the practical application of scientific results in the life of the community.

“The work of the Committee is limited strictly to scientific activity.” (See NATURE, April 24, 1937, p. 697, and May 22, 1937, p. 869.)

This is the concern of the political organization of citizens, including scientists, but not specifically as scientists. In any event, we ought to be careful not to go upon altogether false scents, or set up issues which are too narrow to end the ills from which we suffer. We can go back to bows and arrows but that will not remove the grievances of nations for which they will fight, nor supply the enlightened diplomacy which can keep the peace without injury to a nation's sense of injustice. Do not let us be misled by thinking that the scientist as such can stop war. The military leader can use the triumphs of science to disgrace warfare. That is all. In any event, science cannot cease to follow the exhortation of Carlyle to “Produce in God's name”, and it would be bad for humanity generally if it tried. It is not scientific to deal with the offshoots of evil. The scientific method goes to their roots.

Let us face our present conditions in the historical and biological spirit, and much progress in the science and art of applying science to society and government can be recorded. I am familiar with the complaint that the average scientist in Great Britain has been in despair about his difficulty of getting the discoveries of science which directly affect public welfare appreciated by Government. It would be well for Governments to remove this grievance so far as it is sound, and the creation of the Departments which I have mentioned is a start in better conditions and prospects, and is already having a beneficial effect on administration. Still, departmental contacts with science ought to be extended without delay, and India and the Empire—especially the Colonial Empire for which we have more direct responsibility—should not be overlooked, as indeed everyone acquainted with the work of Manson and Ronald Ross knows has not been done.

It must be evident to everyone who has thought about the social consequences of advances in scientific research that they call for a reinvigoration of social science. The experience of later years points out the urgent desirability for close co-operation between the scientist, the industrialist, and the man of affairs, to enrich the lives of human beings, to help such changes as will diminish the disruptive forces in society, and to promote social solidarity which lies at the root of human progress and happiness.