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## Progressive Science and Social Problems

THE attention which is to be given at the Aberdeen meeting of the British Association to the relations between the advance of science and the life of the community may well make the meeting one of the most notable in its history. To a noteworthy degree the Association has adopted a policy urged upon it some thirty years ago by Sir Norman Lockyer, "to promote the application of scientific methods and results to social problems and public affairs".

This policy may be regarded as the direct outcome of the interest and discussion aroused by the presidential addresses and certain sectional addresses at the York and Leicester meetings. The programme indicates that the majority of the organising committees of the various sections have given very careful consideration to the memorandum placed before them by the Council suggesting that papers, discussions or symposia bearing upon the relations between the advance of science and the life of the community should be included.

Section A (Mathematical and Physical Sciences), for example, is arranging a discussion, to be opened by Mr. C. C. Paterson, on developments in photoelectric cells and their applications, as well as on the repercussion of such developments in the economic and general social life of the community. Even on the scientific side this discussion should meet a great need, for the *modus operandi* of the 'talking film', for example, is understood by comparatively few. The economic and social problems involved have scarcely received clear and critical formulation, nor are the potentialities of the photoelectric cell for the automatic control of processes or the prevention of nuisances anything like so widely grasped as is desirable by industry or by the community at large.

The discussions before Section B (Chemistry) on vitamin C, and on the chemistry of milk, may be relied upon to provide social and economic as well as scientific interest. Of wide general interest also is a full and varied programme arranged by Section F (Economic Science and Statistics). This includes an important discussion on economic planning which will be summed up by Sir Josiah Stamp; papers on risk and its significance in modern economy, statistical investigations into industrial fluctuations, economic anomalies of unemployment relief, and the

organisation of the Scottish fishing industry will deal with particular economic problems of great social importance. Equally significant discussions are being arranged by the Section through its Department of Industrial Co-operation; Sir Josiah Stamp is to open a discussion on the need for a technique of economic change, while jointly with the Section L (Educational Science) an authoritative discussion has been arranged on the planning of a national policy of technical education and industrial recruitment. The presidential address to Section L will deal with the organisation of scientific work at the universities, while a session devoted to the development of post-primary education during the present century bears directly on the social and economic problems visualised in the Council's recommendations, and is closely related to the strictures recently passed on our educational system in regard to education for citizenship.

Much of the original impetus towards the consideration of the social consequences of scientific discoveries was derived from Section G (Engineering). The discussions on the reduction of noise, and Sir James Henderson's paper on the development of inventions as a stimulus to economic recovery, indicate no lack of interest in social implications in this Section, while Section E (Geography) can point to papers on the Aberdeen planning scheme and town planning generally, as well as to a specific discussion on the relations between scientific progress and social life. Papers to be presented before Section I (Physiology) on nutrition in relation to disease, and a symposium of food preservation, indicate the close concern of this Section with social problems; with the discussion on nutrition, Section M (Agriculture) is also associated. The presidential address to the latter section deals with scientific progress and economic planning in relation to rural industry and country life. It will be followed by papers dealing with the planning of agricultural production, the diffusion of scientific knowledge to the farmer and with the sociological problems of the countryside. Cattle rearing and feeding problems will be considered at another discussion.

The presidential address to Section J (Psychology), "Psychology and Social Problems", is also concerned directly with the theme of the Council's recommendations, while the social significance of a discussion on psychological and child guidance clinics and papers on industrial fatigue, bilingualism, vocational guidance, or a sociologist's view

of unemployment, equally attest the way in which the Section is seeking to focus attention on the social problems of the community.

The programme set before the Association at its Aberdeen meeting accordingly betokens a welcome assumption of scientific workers of their civic responsibilities, and indicates that an influential section of the scientific world is coming to think with intelligence and imaginative insight about social affairs. Though the indictment Sir Ernest Simon brought against both schools and universities in regard to education for citizenship is largely deserved, there are obviously honourable exceptions among the ranks of men of science themselves. The discussions before Section L (Educational Science) may, however, make some important contributions towards the realisation of Sir Arthur Salter's plea that a framework of elementary general knowledge added to specialised knowledge should be an indispensable condition for obtaining a university degree, particularly an honours degree.

The question of education is in fact fundamental in the consideration of the social aspects of science. It is not merely that the man of science must be capable of appreciating the non-technical social factors involved as well as the technical and scientific issues; he must secure also the sympathy and understanding of the lay public. A real problem of to-day is that of enabling the common sense of the people to receive the best services of expert statesmen and administrators for the co-operative enterprise of reconstructing the forms of government to fit this scientific age.

The Aberdeen meeting of the British Association is indeed planned to reach that public to an extent not previously contemplated, and if the exposition of scientific and technical knowledge and methods is commensurate with the scope of the programme, some very valuable educational work may be done. The scientific world has to popularise, not merely or even chiefly, its proposals for the scientific control of civilisation, but also the knowledge and method from which those proposals derive their force. Unless we succeed in conveying to the man in the street such a broad understanding of scientific knowledge, there is real danger that a scientific programme may be regarded as the mark of yet another purely political party.

While under modern conditions science and politics can no more be kept apart without damage to the State than science and social questions,

science is entirely unfitted to figure in the programmes of any political party. Unquestionably, as the field of scientific inquiry is extended into social, economic and political questions, the results of such methods and inquiries may lead to conclusions and to policies or programmes for action which are contrary to existing party principles or prejudices. The task of securing action upon the facts is, however, scarcely one for scientific workers as such. It is their responsibility as individual private citizens to do all in their power to secure the appropriate action. They have, however, one further public responsibility which they cannot lightly evade. This is the task of awakening public opinion to the grave danger incurred in the neglect to take action along the lines indicated by the results of impartial and scientific inquiry. In this work the organised expression of scientific opinion through the British Association, the British Science Guild, the Association of Scientific Workers or other means yet to be determined should be of decisive influence, for it is essential to educate public opinion to the importance of the general principle rather than on a particular question in which vested interests may easily confuse the real issues. The organisation of scientific opinion in a way that would be quite irresistible is well within the bounds of possibility, given the requisite will and vision among scientific men themselves.

For such reasons as these, the Aberdeen meeting of the British Association may come to be regarded as a landmark. There is now much more general agreement that our forms of government are at a transition point and may require considerable modification if they are to meet our needs under modern conditions. However far functional change is carried in a democratic system, some means must be found by which the scientific and technical expert can take his part in the work of administration. The possibilities in this direction have already been indicated by the functioning of the expert committees of the League of Nations. On the other hand, it is vitally important that whatever system of government is developed should allow full freedom of growth and development in scientific and technical matters. To limit the field of scientific inquiry, to prescribe research, or to allow obsolete prejudices persistently to bar action in accordance with scientifically ascertained facts, is treason to the scientific spirit, and speedily results in its atrophy. It is in an atmosphere of freedom and not one

of autocratic restrictions that the specialist can function in the way required. Above all, his contribution must not impose a further system of restriction or limitation on the general community. The closer association of science in the task of government is only possible on terms which admit of full and free discussion, of unfettered disinterested inquiry, of undiminished loyalty to truth and a vision characteristic of the great age of Greece.

For the scientific worker himself, he must be imbued with the ideal of service of the whole community, akin to the spirit in which scientific inquiry itself is undertaken. That spirit of service more than any other has prompted the scientific workers who meet in the British Association to inaugurate the many discussions to which we have referred. It has induced many of them to accept responsibilities of citizenship and of education from which they would willingly be free in order to pursue their scientific inquiries with greater energy. Their continuance in such tasks, their co-operation in the machinery of government to an ever increasing extent, cannot, however, be maintained on any sectional terms. Their help will be given in a spirit of wholehearted and unselfish service for the whole community as part of their allegiance to the supreme claims of truth, and no State which permits the wavering of that spirit or that allegiance can hope to withstand the pressure of modern conditions.

### Matter and its Architecture

*The Crystalline State.* Edited by Sir William Bragg and Dr. W. L. Bragg. Vol. 1 : *A General Survey.* By W. L. Bragg. Pp. xiv+352+32 plates. (London : G. Bell and Sons, Ltd., 1933.) 26s. net.

THE goal of chemistry is the determination of the atomic arrangement in space, which will be able to account for all the properties of matter under consideration. The greatest achievements in this direction have been obtained by the application of purely chemical methods, essentially because of the wonderful artistic skill of generations of chemists. Since von Laue's discovery of the diffraction of X-rays, and Sir William and W. L. Bragg's first X-ray analysis of the crystalline state, however, the way has been opened to a much more intimate knowledge of the atomic pattern. It is characteristic that the first results of the X-ray method dealt with the