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The Social Mission of Science

NOTHING has been more striking in the recent meetings of the British Association at Blackpool than the general indignation at the prostitution of the results of scientific inquiry for purposes of warfare, and the concern at the spread of political systems which reduce science itself and other of the richest elements in our intellectual heritage to servitude.

The opening address on cultural and social values of science (see NATURE, October 3, p. 594) with its emphatic repudiation of the inhumanity and insane misuse of science in the extension of aerial warfare to the destruction of cities and the killing and maiming of women and children by poison gas, incendiary bombs and high explosives, against which the only real defence is by retaliation, found echoes in the presidential address to Section G (Engineering) as in that of Prof. Philip to Section B (Chemistry). Sir Daniel Hall, speaking on science and social organization, uttered a grim warning that while of old every autocracy ended in a revolution, the chances of its successful overthrow in the face of guns and gas to-day are very different. Moreover, control by force is being reinforced by a subtler technique of subduing minds until the population is content to be slaves.

Prof. H. J. Fleure, in a further address on the science of man and the problems of to-day, urged the claims of science and intellectual freedom against aggressive and reactionary doctrines, nationalist and others, which are put forward to-day, and, like Dr. J. S. Huxley, strongly criticized the pretensions which attempt to erect fanatical racial hatred to the dignity of a science. Equally, Lord Horder emphasized the death which the totalitarian systems brought to the scientific spirit and the dangers which attend the sacrifice of individual freedom.

On many of the great issues of the modern world, the Blackpool meeting has made it plain where scientific workers in Great Britain stand. That they have not been unmindful of the responsibility to which the recent report of the University Grants Committee referred, is a hopeful sign; and it is well to remember that many of the addresses could scarcely have been delivered in some other European countries without disastrous consequences to the speakers. Even Sir Henry Dale's plea for support of tropical medical research more commensurate with our territorial responsibilities, for example, would almost certainly have been suppressed, in other circumstances, as detracting from the idea that the State can do no wrong.

It may be said, of course, that denunciation and demonstration are not enough, and in some of the speeches efforts were made to point out definite lines of advance. Scientific workers as such, however, can have no final power over policy, national or international; and without disparaging the need for practical proposals and definite organization, in which others besides scientific workers can participate, to prevent the infamous use of scientific work, it is well to remember that science has a spiritual message which her followers must give regardless of whether others heed its warnings or not.

This message of science also found welcome expression in discussions at the British Association meetings. The influence of science upon material progress and human comfort is much more commonly understood than its effect upon the human mind. To-day it is difficult to realize the liberation of life and intellect brought about by

the works of Copernicus, Galileo and other pioneers of experimental philosophy. The principles of self-determination and self-government now accepted as democratic rights are indeed social effects of the independence of scientific inquiry involved in the new philosophy. The freedom of thought and action possessed by progressive peoples are direct consequences of the work of Galileo and other founders of experimental science.

Accordingly, it is well that scientific workers should take up the challenge which modern autocracies offer, not only to science itself but also to all that is best in man's heritage of culture. It is not for nothing that one after another of the speakers who followed Sir Richard Gregory in the discussion on cultural and social values of science deplored the decline of democracy and enlightened outlook. The whole discussion demonstrated the deep and wide respect still to be found for liberal culture, and the strength of the support which could be secured for positive action by a successful co-ordination of those connected with all cultural activities. In another discussion, on the strain of modern life, Lord Horder even more explicitly asserted his faith in the individual and in the enormous potentialities of the human spirit, maintaining that a rebirth of this spirit in British political life would be one of the best medicines our strained lives could have administered to them.

When individual freedom had been sacrificed, Lord Horder saw little chance of achieving the control through which alone he believed salvation could come to the human race. Chief among the remedies for the ill-effect of the strain of modern life he placed science, and especially science directed toward the study and development of the mind and spirit of men. So, too, Prof. Fleure pleaded for the scientific study of mankind as essential if society is to advance. Disregard of its teachings is one cause of the dislocation and disturbance which are baffling us all. Like Sir Daniel Hall, he also entered a fine plea for freedom of conscience and self-control in action on scientific grounds as the life-breath of policy and science. We cannot restrict scientific thought and imagination to defined spheres: sooner or later it must intrude everywhere.

The true aim of science is the enrichment of life, and the specific value of an education based on science is that it will encourage, if not create, a habit of acting on reason rather than emotion. Moreover, such an education could destroy the dangerous delusions which loyalties of party, country and religion are apt to foster, and teach people from their earliest years that men and women, however diverse as individuals, are collectively very much alike, and for this purpose a scientific education is more effective than a purely literary education. Science taught, not as an aid to a vocation but as part of the training of a modern citizen, may develop a habit of mind as ethical as that usually only associated with the study of what are called the humanities.

Apart from this, the cultural claims of science, as Prof. L. Hogben has pointed out, rest on the social fact that the use and measure of science intimately affects the everyday life of every citizen in a modern community. Education for citizenship, in fact, demands a knowledge of how science is misused, of the ways in which we fail to make the fullest use of science for our social well-being, and some vision of what human life could be if we planned our resources intelligently.

The cultural and spiritual claims of science need such emphasis if scientific workers are ever to make the full constructive contribution to the solution of the world problems of to-day which lies within their power. It is well, therefore, that such emphatic warnings should be uttered against the mass movements which now threaten the finest elements in the national life of almost every country. Without criticism the very life of society is stifled, and descent to the community of soldier and worker is rapid. Only as we can enlist the citizen in the constructive task of using wisely the new powers which science has placed at our disposal can we hope to preserve what is best in the world's heritage of culture, let alone to add to it.

This is the task of science in the education of the citizen. Before a new world-wide social order can be built up worthy of the limitless powers which the advance of science has put into the hands of men, the general community and its leaders must be persuaded that acquaintanceship with scientific forces is an essential condition of enlightened government. Without an adequate scientific background, it is impossible to evolve a social and political system in which progressive knowledge is used for the wisest and best purposes.

Even though some scientific workers may regard it as of little use to protest against the use of scientific knowledge in implements of war, they should not be unmindful of the necessity for science first to deliver her spiritual message

regardless of whether it is heeded or not, and for her followers to seek to achieve the educational work which is an essential condition of transition to a better order. The misgivings expressed at Blackpool find support from such wide quarters as at Washington, in Mr. Cordell Hull's address to the delegates at the World Power Conference, in meetings of chemists at Bangalore, among scientific workers at the University of Cape Town, Cambridge and elsewhere; and they indicate that scientific workers are becoming ready to study these questions intensively, and either to develop an organization through which an effective common policy is possible or secure a re-orientation of existing organizations that would be equally effective. Nowhere is this feeling stronger than in Great Britain and the Dominions Overseas and in the United States of America, and the revived interest in the effect of science on society, as well as the quickened concern displayed at the British Association meetings at the use of science in the growing preparations for war, embolden the hope that a *rapprochement* for some such purpose as this between the British Association and the American Association for the Advancement of Science may not be impossible or impracticable.

The Rise of Man

Man makes Himself

By V. Gordon Childe. (The Library of Science and Culture.) Pp. xii+275. (London: Watts and Co., 1936.) 7*s*. 6*d*. net.

PROF. GORDON CHILDE has a sense of perspective in time, which has been developed to a degree exceptional even among archæologists, who juggle with millennia; and he is little more restricted in space, for he ranges from the north of Scotland to the Valley of the Indus with a familiarity which few may emulate. He is, therefore, in a position to recommend with confidence the study of archæology as an antidote to those modern pessimists, who are disposed to doubt the soundness of the foundations upon which the belief in 'progress', inherited from the late nineteenth century, takes its stand. Neither 'age', nor century, he argues, and equally no single area marked out by geographical or national limitations, can afford material adequate for such a judgment. The impartial inquirer must survey all time, and take the whole world as his province, before he ventures to pronounce upon the trend of events in present-day civilization.

However, even if the scope of inquiry in any estimate of modern development be extended to the broadest limits possible, the impartial point of view of a scientific investigator demands an objective standard by which 'progress' may be measured. As is well known, the judgment of the historian is apt to be coloured by his ideals—or prejudices; and essays in formulating an objective test, such as "an increased command over the material resources of Nature", are liable to be called into question. Prof. Childe offers as his objective standard the evolutionary principle of "survival of the fittest", which has the obvious merit that it links the study of man with biology and palæontology, and at the same time, as interpreted by him, bridges the awkward gap between physical and cultural, which has proved a stumbling block in much theorizing. Recognizing the ambiguity, or rather lack of content, in "the fittest", he interprets his criterion of progress as an increased capacity to enable members of the species to survive. In other words, the effect of any real advance in human development, physical or cultural, is shown in a consequent increase in population, as in the sharp rise in the population curve characteristic of the years which followed the Industrial Revolution of the early nineteenth century.

In the demonstration of the content of 'progress' which follows as a necessary corollary to his test of advance in the development of man, Prof. Childe shows that prehistory affords evidence of the occurrence of a succession of revolutions comparable to the Industrial Revolution, and of no less importance in the history of civilization. Some, indeed, almost certainly must have produced more far-reaching consequences than anything of which we know in recorded history. Here he elaborates suggestions which he put forward recently in his presidential address to the Prehistoric Society. He then pointed out that while the divisions of prehistory, the Stone, Bronze and Iron Ages, have lost the general and absolute chronological significance once attached to them, and as dates must now be regarded as applying only within restricted areas and under definite limitations, they are still significant as indicating certain crucial economic changes, which affect the