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Science and Culture

THE part played by science in modern life, and the greater part it should play, are themes that offer appetizing food for thought to those engaged in scientific pursuits ; but most laymen "look up and are fed not", regarding science as something abstruse and esoteric, and remaining content to enjoy its benefits without inquiring into their past or future. All devotees of science will therefore welcome the renewed efforts which the British Association is making to bring home to the public the nature and magnitude of the services rendered by science to the community, and the ways in which science enters into, and maybe colours, their daily life.

The most obvious effects of science upon man are the directly material : food, clothing, shelter, and so on. Less obvious are its effects upon social and economic conditions, due largely to developments in the use of steam, water, electricity and mineral oil as sources of power. The least obvious influence of science upon man is the way in which it has revolutionized his general intellectual outlook (*Weltanschauung*). It is to this last aspect that we would here direct attention, our reflections thereon having been prompted by the address with which Sir Richard Gregory opened the discussion on "Cultural and Social Values of Science" at the Blackpool meeting of the British Association.

One of the handicaps under which the man of science labours in communicating his thoughts to the outside world is the necessity for using abstract terms that defy precise definition. He may use far too many of them, but he must use some ; so to avoid misunderstanding and confusion of thought, it is always desirable to start with a preliminary explanation of the meaning of the chief abstract terms he intends to employ. The

word 'science', for example, is used very loosely in everyday life : to some it signifies a kind of magic—sometimes 'black' magic ; to the school-boy it is 'stinks' or 'bugs' ; to many educated people it is an esoteric and recondite activity that touches human life but fleetingly and tangentially ; the journalist uses it in describing boxing, cricket and other pastimes, and the advertiser in any way that helps to sell his wares.

For most people, probably the best definition of a science is 'a body of accurate knowledge', obtained by observation, often under experimental conditions, and sound reasoning. It would be going too far to elaborate this definition by discussing experimental technique, the nature of theories and hypotheses, and the kinds of reasoning, inductive and deductive, used by the research worker ; but in any event effort should be made to disabuse the mind that science is a dull, lifeless thing, and that scientific workers are merely highly organized automata. Success in scientific inquiry, it might be pointed out, implies the possession of some of the higher human qualities, such as courage to look facts squarely in the face and to accept conclusions even when they are unpleasant or subversive of established practice and belief ; patience ; a disciplined imagination ; an open mind and a critical outlook ; and, perhaps the greatest of all, the artist's sense of striving for perfection.

Culture resembles science in having its roots in accurate knowledge and in critical thought. It is, however, more than knowledge or learning (a small amount of learning is compatible with a high degree of culture), because in concentrating on "the *best* that has been thought and known in the world", it becomes essentially a study of

perfection. Culture has therefore close affinities to science, art and ethics. Matthew Arnold, the nineteenth-century apostle of culture, took the view that the pre-eminent part of culture is not "the scientific passion, the sheer desire, to see things as they are", but such ethical elements as love for one's neighbour, beneficence, the desire to remove human error, confusion and misery, and the noble aspiration to leave the world better and happier than we found it.

The distinguishing feature of science would thus appear to be accurate knowledge, and that of culture to be taste, judgment or discrimination between the true and the false, the good and the bad, the beautiful and the ugly. Were Matthew Arnold living to-day, he would readily acknowledge the benefits that science has conferred on humanity in the directions he indicated. Has it not exposed many causes of human error and dissipated confusion of thought? Has it not done wonders in preventing, alleviating and curing physical pain? Has it not provided man with the physical means towards a fuller and richer life? If science has not made man ethically better, that is not the fault of science, for it may be claimed that the golden rule of conduct—consideration for others—which is the foundation of morality and the non-material basis of happiness in communal life, is a valid scientific deduction from the data of experience. Emotion being a more potent factor in conduct than knowledge (*Pour faire quelque chose de grand il faut être passionné*), the contributions of science to "the good life" may compare unfavourably with those of art and religion, but it will be agreed that no conduct can in effect be good unless it conforms with the dictates of reason.

The influence of science upon the development of man, both as an individual and as a member of society, is apt to be overlooked by the historian. The pioneers of natural science, like Copernicus, Galileo, Bacon, Descartes and Darwin, by overthrowing the geocentric and anthropocentric doctrines of their times, and by establishing belief in the constancy of the order of Nature, freed the human mind from the fetters of dogma and unreasoning faith, and opened up possibilities of knowledge and attainment that we are now only beginning to realize and explore.

The services of these men, and of many others who have contributed to our knowledge of the universe and to the liberation of human thought, should be taught and discussed in our schools, and, generally, our educational curricula should be

re-oriented in the direction of greater concentration upon the best that has been thought, known *and done* in the world, irrespective of time and geographical location. Our teachers need to be men and women of higher culture, seeking to emulate the great men of culture, who, as Matthew Arnold said, "have had a passion for diffusing, for making prevail, for carrying from one end of society to the other, the best knowledge, the best ideas of their time; who have laboured to divest knowledge of all that was harsh, uncouth, difficult, abstract, professional, exclusive: to humanize it, to make it efficient outside the clique of the cultivated and learned, yet still remaining the *best* knowledge and thought of the time, and a true source, therefore, of sweetness and light".

The question arises, therefore, whether bodies like the British Association and the Royal Society cannot, in conformity with their statutes, tread the path of the diffusion of natural knowledge with greater vigour than heretofore. Neither body issues a publication which really hits the educational bull's-eye. The Association, it is true, enjoys what is called 'a good Press', but unfortunately that Press, in pursuit of commercial aims, largely selects matter that is calculated to create a sensation, and which seldom leaves a lasting impression.

We therefore suggest that the Council of the Association be urged to consider the advisability of publishing on its own account a special volume, to be available at a low price, containing those addresses, lectures, papers and discussions, or parts of them, which have a direct bearing upon the life of the community, and including descriptions of discoveries and inventions, new light on old truths, economic and social problems, and contributions to higher thought. Authors could be advised in advance that their contributions were ear-marked for dissemination among the public, and that therefore they should be written so far as possible in non-academic language, with a non-academic approach, and with the express object of arousing interest in and appreciation of the social and cultural implications of scientific research among those who are still largely ignorant of or indifferent to it. The first quinquennial review of the progress of science, prepared for the Association by a number of authors, and shortly to be published, though not entirely of this character, should be of great service in extending interest in scientific knowledge and achievement. Our hope for the future lies in enlightened education of this kind.