accordingly should be welcomed by the scientist or technologist who shares that sense of the ethical values which Smuts and others since, like Hinshelwood, Appleton and Ashby, have expounded, whether or not Prof. Coulson's own faith is fully accepted. This attempt to stir Christian people to constructive thinking and the facing of change leads, for example, to an eloquent plea for an educational system which allows no child to pass through it without some acquaintance with both science and technology.

In a way, the Lecture could be described as an attempt to interpret in a specific Christian context the essential message of the Duke of Edinburgh's Study Conference at Oxford in 1956. The challenge of change is presented just as clearly, and Prof. Coulson brings out the social and human issues involved, to the solution of which he is convinced that Christian principles of conduct have an essential contribution to make. Here, however, the emphasis on the pace of change and the decay of tradition recalls a fine passage in A. N. Whitehead's *Adventures of Ideas*, which discusses routine, tradition and change and their implications in the modern world.

Prof. Coulson is never trivial and writes with a sincerity, dignity and restraint that should enlist the support even of those inclined to take umbrage at his claim that some of his principles are specifically Christian, in the immense task to which he calls us of seeking to use creatively and imaginatively all the vast powers now at the disposal of mankind, with the sensitive insight into human needs, the profound respect for human personality and the confidence that the world has learned particularly from the life of Christ. Prof. Coulson's scholarship and wide reading characterize this short book as profoundly as his human sympathy and his Christian faith, and although it is unfair to expect too much in such matters of a published lecture, regret may be entertained that the book loses something of its full value as a stimulus to further study through the absence of an index and all but a handful of references.

R. BRIGHTMAN

FROM ARTS AND CRAFTS TO TECHNOLOGY

A Short History of Technology from the Earliest Times to A.D. 1900

By T. K. Derry and Trevor I. Williams. Pp. xviii + 782. (Oxford: Clarendon Press; London: Oxford University Press, 1960.) 38s. net.

AS the large five-volume *History of Technology* was being written by Prof. Charles Singer and his colleagues, an abridged edition was planned to meet both the needs of a wider readership (the larger handbook unfortunately being beyond the means of the average reader) and the desirability of establishing more firmly in the minds of both historians and engineers the relation between the history of technology and history in general. Imperial Chemical Industries have again generously supported this venture. The fortunate fact that one of the authors, Dr. Trevor I. Williams, is not only well known as the editor of *Endeavour* but was also for several years engaged in assisting Prof. Singer in producing his pioneer handbook

has made it possible to use the evidence and manuscripts collected in compiling the five-volume work. This is also the source of most of the 353 figures used in the text of this new book.

However, the authors have by no means produced merely an abridgment of Singer's handbook. They have planned their own "technological history and history of technology", in which the essential trends and developments are presented in a concise and very readable form. A good bibliography, designed for the English reader, points the way for further detailed work on the subjects broached in the various chapters.

The book consists of two sections, each of which is preceded by a "General Historical Survey" of the period covered. The first section "From the Earliest Times to A.D. 1750" takes up about one-third of this 700-page text-book. In nine thirty-page chapters we are introduced to the crafts necessary for producing food and satisfying other domestic needs, mining and metallurgy, transport, recording and communications, sources of power and the earliest forms of the chemical industry, and their history is carried up to the Industrial Revolution.

The remaining two-thirds of the book and more than 220 illustrations cover "The Industrial Revolution to A.D. 1900". This upper limit has been quite rightly chosen by the authors, as "by 1900 the most advanced societies were beginning to register a change in the aims, as distinct from the methods, of technology. For man was no longer pitting his wits against Nature merely for the easier satisfaction of long-felt wants. . . . With the entry upon a new period, in which necessity ceases to be the mother of invention", the inventor began to create new wants, and technology is embedded firmer than ever in the general history of civilization.

The last section deals with many tools, methods and machines, with which most of us are still familiar, even if some forms of technology are now slowly disappearing. Here we are confronted with the history of the steam engine and turbines, machine tools and the development of interchangeable machine parts. New materials such as wrought and cast iron, steel and concrete begin to play a prominent part. Transport is transformed by the coming of the steamer, railways, bicycles, motor-cars and aeroplanes. Coal-mining grows and fosters the cheap production of iron and steel and initiates the coal-gas and coal-tar industries. Pure synthetic chemicals such as soda, sulphuric acid, nitric acid and ammonia are basic products for a new chemical industry. Rubber and petroleum create the 'motor age', and there is the new electrical industry which provides better communications, lighting and power. Finally, there is modern mechanized farming and the processing and preservation of farm-products by canning and refrigeration.

These and many more subjects are here presented in a form which will prove to be most valuable to the historian without technical training, who, in his turn, will be confronted with the gaps in our knowledge for which he will be called on to provide the clues for further research, together with the engineer and the technologist. Seven tables relating political and economic historical data to those of technology are given at the end of this book, which is without doubt a most valuable introductory manual to a historical discipline still in its pioneering age.

R. J. FORBES