

and colleges of advanced technology, and on other forms of further education, which he reminds us are for many more appropriate than either a university institution or a college of technology. The second part, which occupies less than 50 of his 180-odd pages, is more philosophical and exploratory. Its three chapters, on the cultural criss-cross, on the limitation of intellectualism, and on science and religion, seek to outline the dilemma in which the rising generation is placed by the steady erosion by specialization of the areas of agreement and mutual understanding.

Even the factual survey is packed with sense and constructive suggestions and makes a useful contribution to any discussion on the impact of science on society which does not make comfortable reading for those responsible for policy. He has no use for policy which is not determined on educational grounds but by political ideology. Mr. Pinion has an eye for the essentials and is every bit as forthright as Dr. Young in condemning the waste of resources on trivialities and in asserting the need for fresh and unprejudiced thinking. It is, however, above all in what he writes, in his second part, about communication between scientist and non-scientist and on the limitations of intellectualism that he is most challenging. In contrast to Mr. Bantock, who has reservations regarding technology, he has, like Sir Eric Ashby, a deep sense of the value of science and of technology as cultural elements themselves, and his final chapter on science and religion is outstanding in its insight and balance. The greatness and value of science are that, besides teaching us the wonders of creation, it also, seen in the perspective of its conclusions, gives us a sense both of man's power for good and of his fallibility and weakness. Science and religion, in Mr. Pinion's view, can meet, but both must adjust their attitudes. His book is well written as well as stimulating and his wide and apt quotations are supported by an admirable reading list. Fully as effectively as either Mr. Bantock or Dr. Young, he brings us face to face with some of the vital issues with which the advent of compulsory education and the prospect of universal literacy has confronted civilization for the first time within the past hundred years. He points alike to the need for fresh thinking and enquiry if the issues are to be resolved in terms of respect for human personality and on the basis of fact rather than fiction or prejudice.

R. BRIGHTMAN

GEOGRAPHY OF THE ICE AGE

Environment and Archeology

An Introduction to Pleistocene Geography. By K. W. Butzer. Pp. xvii + 524. (London: Methuen and Co., Ltd., 1965.) 84s.

ENVIRONMENT and Archeology is an attempt to show how the geography of the Pleistocene period may be reconstructed and to illustrate the extent to which such reconstruction is at present possible. Part 1 is introductory and largely concerned with the abnormal nature of the Pleistocene, its extent in geological time and the present state of success in dating it in absolute terms. Part 2 is concerned with the interpretation of vegetation, soils and landforms in terms of climate, Part 3 with the interpretation of sedimentary evidence, Part 4 with the interpretation of biological evidence, mostly pollen and macroscopic plant analyses and studies of mammalian faunas. Part 5 is a series of reconstructions mostly of the Late Pleistocene geography of different regions with a natural bias towards the Mediterranean and African areas with which the author is most familiar. Part 6 is virtually a series of essays on aspects of prehistoric human geography.

It may be appreciated from the foregoing summary that the field attempted is vast, and this is the source of both the strength and weakness of the work. No one

Pleistocene specialist will attempt to cover more than one or at most two specialized aspects: he may be a 'beetle man' or a 'snail man' but rarely both; he may be a 'plant and landform man' but not a 'plant, landform and mammal man'. Thus, any synthesis such as this must place a great deal of reliance on secondary sources, on review papers and on the standard teaching manuals on landforms, soils and vegetation. This is inevitable, but it does lead in places to an air of certainty which the specialist would probably disclaim. Practically all questions on such subjects as the origin of landforms and the precise controls of plant and animal species distributions are open ones. But when such evidence is used in palaeogeographic reconstruction one particular interpretation must be chosen for each line of evidence and the interpretation of one piece of evidence may be conditioned by that already put on another. The result may be a sum of truths or a sum of errors, or more commonly a mixture. Perhaps it would have been better not to have attempted to teach the skeletal and hence seemingly dogmatic treatments of soil science, climatology and geomorphology of Part 2, but to refer the reader to reference works for systematic information and to discuss more fully the interpretative doubts.

Yet the apparent dogmatism is conditioned more by the telescoping necessary to cover the field than by any lack of critical appreciation on the part of the author, who deals critically with such vexed questions as the differences between modern and Pleistocene periglacial climates consequent on the different latitudinal positions, with the possibility of the vegetation succession being either climatic or edaphic and with many other awkward problems. Perhaps he relies more on vertebrate evidence, which is subject to human as well as to physiographic controls, than on the invertebrate evidence of such creatures as beetles and snails, which more nearly reflect only physiographic controls—but this may only be a difference of taste between the author and myself. All in all, the book is very valuable and very welcome. In a period when Pleistocene investigations, like many other branches of knowledge, are in danger of disintegrating into mutually semi-comprehensible specialisms, it performs the invaluable constructive and difficult task of synthesis. As such, it should be received with praise and charity by undergraduates, researchers and all interested in the fascinating field of Pleistocene geography.

B. W. SPARKS

EQUILIBRIA IN IRON AND STEEL MAKING

Phase Equilibria Among Oxides in Steelmaking

By Prof. Arnulf Muan and Prof. E. F. Osborn. Pp. xx + 236. (Reading, Mass.: Addison-Wesley Publishing Company, Inc.; London: Pergamon Press, Ltd., 1965.) 135s.

IN any long-established industry there is a well-defined art which, as knowledge increases, develops into a science. The art exists because it is successful and, although it may have complexities based more on tradition than on logic, the majority of the practice has evolved from sound, factual experience. Following as it does on the art, the science is not always received as enthusiastically as the scientist may desire: this arises, partly, from the difficulties of communicating the use of new ideas to technologists whose training has preceded the advancement of the science. Furthermore, it can happen that the facility to manipulate scientific data is lost in a disastrously short time by the scientist working in industry. Any attempt to overcome these difficulties in converting an art to a science is laudable, but the task is difficult, criticism is freely given, and failure is fairly easy.

The American Iron and Steel Institute has for some years sponsored investigations of phase equilibria in