

task of education should be proceeding if Britain is to enter on the fuller living for all and play that part in world affairs which she is, or will be, equipped to play. Britain will not get there either by belittling her past or present achievements—of which she has every right to be proud—or by ignoring the need for change and development, and that rapidly and urgently.

This succession of reports—the Newsom Report, the Robbins Report, the Trend Report—have pointed to some weaknesses in Britain's existing arrangements, some of which were long overdue for redress. They point also to excellences which Britain should be careful to preserve, as they also stress the limited resources which, in any event temporarily, are at her disposal for the task of reform. It is a touchstone of the sincerity with which any political party cares for the future of Britain that it should be at pains to avoid any dissipation of such resources in pointless party strife. Argument there must be; but let that argument be to the point, seeking to clarify the real issues and to secure effective action, speedily and with all possible resources, with courage and with imagination. There need then be no fear of the response from scientists or from other sections of the community.

No programme or policy that is to achieve such objectives can help injuring some interests. Some areas are to decline relatively while others expand in any policy of growth, and, as Prof. Wilson stressed at Aberdeen, growth requires a rapid transfer of some resources from less efficient to more efficient concerns. Britain cannot continue to bolster up inefficiency any more than she can condone restrictive practices wherever met. The public interest must be served and manifestly served, though it should not be, and indeed is not, served in such a way that no provision is made for the weakling. But planning for change means willingness to change: the change in political climate which the political parties should be promoting now is one from a temper which dwells on the shortcomings of others to those of which the dominant note is one of promoting the adventure of change. The developments which lie ahead in education and elsewhere will be of little avail unless something of the spirit which made Britain great in the past can be brought to the tasks of to-morrow.

MEDICINE AND MANNED SPACE FLIGHT

Space Medicine

By Ursula T. Slager. Pp. xi+388. (London: Prentice Hall International Inc., 1962.) 84s.

IN her preface, the author states that her purpose was to produce a "basic textbook relating the known and well-established physical and physiological factors of manned space flight". She points out that the past few years have seen an extremely rapid increase of knowledge in this field, and that most of the information is widely dispersed in specialized journals. The book was designed to present both the engineer involved in the design and construction of manned space-craft and the "busy physician" who would like to satisfy his interest in this field with an introduction to space medicine. The author, who by training is a pathologist, has, however, written a book which, while being within the comprehension of the biologist, fails, in my opinion, to present the physiological information it contains in a form which can be readily understood by a reader trained in the engineering sciences. Even sections of the book which are supposed to be of

direct use to the designer utilize obscure medical terminology.

The book is divided into three parts. The first part, which covers the reactions of man to the physical features of space, contains chapters devoted to the physiological effects of changes in the pressure and composition of the gaseous environment, of changes in the thermal environment and of exposure to ionizing and non-ionizing radiations. The methods by which the effects produced by exposure to the special environments may be minimized are also presented. The actual descriptions of the physiology of these environments are, however, badly composed and ill-balanced. They also contain a number of gross inaccuracies such as that, in a subject breathing air at sea-level, each 100 ml. of blood flowing through the tissues gives up 15 ml. of oxygen and that the oxygen uptake of the tissues is reduced by an exposure to breathing air at 15,000 ft. Although the author suggests that the optimum space cabin atmosphere is 80–100 per cent oxygen at a pressure of 280 mm mercury, as was used in the *Mercury* vehicles, there is a considerable body of evidence not presented in this book which suggests that a mixture of 50 per cent oxygen and 50 per cent inert gas at a pressure of the order of 400 mm mercury would be nearer the physiological desirable atmosphere.

The second section of the book, which is concerned with the dynamic factors of space flight, is sub-divided into chapters on the effects of acceleration, the weightless state and of noise and vibration. Again the accounts of the physiological changes which these environmental factors produce are confused and contain inaccuracies such as the statement that the cardiovascular reflexes induced by an increase of arterial pressure are mediated by the aortic and carotid bodies. There is no mention of the lung collapse which is produced by applied accelerative forces, particularly in the absence of an inert gas in the environment.

The final section of this book is devoted to ecology of the space cabin and contains chapters which describe the metabolic requirements, the toxicology of the sealed cabin and the psychological problems associated with space flight. There is an informative section on the methods whereby an acceptable sealed cabin environment may be provided. Although the psychological effects of isolation and sensory deprivation are emphasized in this book, experience gained in the United States, so far, would suggest that in practice the opposite situation, that of over-burdening the man, is more likely to be a problem in space operations in the near future.

This book provides an overall picture of the physiological problems associated with space flight and of the limits of man's tolerance to the various factors met in the environment of space. The general balance of the book is, however, rather uneven and the text contains numerous inaccuracies. Each chapter is provided with a good bibliography, although the references, with one exception, are confined to the American literature. I cannot recommend this book as a source of biological information to those working in the engineering sciences.

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PHYSICS OF THE EARTH

The Physical Constitution of the Earth

By Jean Coulomb and Georges Jobert. Translated by A. E. M. Nairn. Pp. xi+328. (Edinburgh and London: Oliver and Boyd, Ltd., 1963.) 50s.

THE original French edition of this book was published in 1952, but there has been extensive revision, and work up to 1960 is discussed (I have noticed one reference dated 1961). This is creditable since two printings and a translation have intervened. The subjects dealt with are: seismology, gravity, the hydrostatic hypothesis,