

a few can be mentioned. The reference to superconduction should either be omitted or made more accurate, even at the expense of a few more lines of description. Resistance alloys should be described by composition rather than by trade names. Impedances should not be described as vectors, and the special interpretation of the meaning of vectors when applied to sinusoidally varying quantities should be stressed more heavily.

Students usually have considerable difficulty in dealing with the sign in problems involving mutual inductance. The treatment here is somewhat perfunctory, and an expansion together with a diagram showing clearly the direction of winding of coils, the direction of currents and of voltages, would be of great assistance to them.

The setting of the type is generally good and only a few errors, none of great moment, were observed. There is, however, an excessive use of the solidus in the equations throughout the book, and this makes reading difficult.

A. H. M. ARNOLD

SCIENCE AND LIBERAL EDUCATION

Science and Liberal Education

By Dr. Bentley Glass. (Davis Washington Mitchell Lectures—Tulane University.) Pp. x+115. (Baton Rouge: Louisiana State University Press, 1959.) 3 dollars.

THIS book is based on the Davis Washington Mitchell Lectures given by Bentley Glass at Tulane University. Of the three lectures, one only, the second, deals with the subject the title of which is given above. Prof. Glass's primary research and teaching interests are concerned with genetics and especially with the influence of radiation on human heredity. In this connexion he serves as an adviser to the Atomic Energy Commission and as a member of the National Academy of Science's Committee on the Genetic Effects of Atomic Radiation. He is well known in the United States for his ability to interpret to the public significant aspects of genetic research.

His first lecture concerns genetics in the service of man. Prof. Glass's style is popular in the best sense of the word—he does not sacrifice the dignity and scholarship of the science for an easy, superficial appeal. The lecture is devoted to the genetics of plants in relation to their food value and the genetics of animals and man in relation to disease. After touching on the effects of radiation on mutation-rates, Prof. Glass considers the future of the human race in relation to population control and limitation, and he stresses the difficulties rather than the solutions of the matter.

His essay on liberal education in the scientific age is worth expansion into a whole book. It may be summarized in his own words: "Science, in ever greater measure, must permeate the study and teaching of each of the arts, humanities, and studies. These, on their side, must mollify, enrich and protect the sciences". This may appear to be trite, because it is so often said by educationists to-day; but, in an engaging manner, Prof. Glass is able to add some new and interesting ideas to this important and topical problem.

The third and last essay, which deals with Darwinian evolution and human values, is equally

brilliant. There is a short, critical review of the present position of Darwinism in the larger sphere of evolution. There is much in common in these essays with Prof. Peter Medawar's Reith Lectures, and in the work here considered it is interesting to observe the different approach with its piquant American flavour.

W. L. SUMNER

THE AGEING INDIVIDUAL

Handbook of Aging and the Individual

Psychological and Biological Aspects. Edited by James E. Birren. Pp. xii+939. (Chicago: University of Chicago Press; London: Cambridge University Press, 1959.) 12.50 dollars; 100s.

THIS enormous volume is symptomatic of the growing interest in and research on the topic of ageing in the United States. The first of three handbooks aiming at summarizing all that is known to-day about the problems of human ageing, the present work, edited by Dr. James E. Birren of the National Institute of Mental Health, Maryland, is concerned with the psychological and biological problems of the ageing individual. It is to be followed by two volumes on social gerontology.

Primarily a work of reference, and intended as a definitive secondary source of data, the handbook succeeds in compressing a vast amount of information on almost every conceivable aspect of human ageing—biological, morphological, neurophysiological, neurochemical, genetic, pathological, environmental and psychological (with perhaps a major emphasis on the psychological). The editing has been well done: there is no undue overlapping between the contributions of the thirty authors, and the standard is in general first rate. Although there is inevitably a good deal of padding in the form of general background material not specifically concerned with ageing, this can perhaps be justified in a work designed to be of use to workers trained in quite a variety of different disciplines.

In two respects the book is more than compilation, and is likely to be of first-hand interest to gerontologists. First, it discusses perhaps more thoroughly than has been done before the fundamental principles and methodology of the study of ageing. Secondly, by reason of the very completeness of its coverage, it points to gaps in knowledge and suggests areas urgently needing more research. The book, in any event in parts, has a stimulating and suggestive quality that is not too common in synthetic productions of this kind. No doubt the editor, Dr. J. E. Birren, is largely responsible for this, and his own contribution on "The Principles of Research on Aging" with which the book opens is a particularly valuable one, discussing both the special problems of research design encountered in the study of ageing, and some of the fundamental theoretical issues involved in the concept of ageing. Some of these issues are taken up in the two succeeding chapters on time and ageing by Reichenbach and Mathers, and biological periodicities by Landahl. Ageing is a process closely connected with the passage of time, and Birren and his collaborators may well be right in thinking that the systematic theoretical foundations of ageing research have their foundations in the theory of time.

L. S. HEARNshaw