REVIEWS

ALZHEIMER'S DISEASE AND RELATED CONDITIONS. A Ciba Foundation Symposium.
Edited by G. E. W. Wolstenholme and Maeve O'Connor.

Alzheimer's disease is a primary degenerative disorder of the brain and spinal cord of unknown aetiology, usually starting in middle life. The initial symptoms are memory disturbance, spatial disorientation and a lack of spontaneity of movement, and these are followed by progressive organic dementia, often accompanied by seizures.

The book consists of fifteen papers, each followed by useful discussions, which were given at a Ciba Foundation symposium on Alzheimer's disease (and related conditions) in November 1969. The clinical manifestations, various aspects of the pathology, the genetics and the biochemical abnormalities are all dealt with in detail, and by far the most interesting aspect is the association with amyloid degeneration, since this is a key material in research on ageing.

Amyloid is found normally in old people, but in Alzheimer's disease (and in mongolism) it appears unusually early and the question is whether one is dealing with the consequence of ageing occurring at an accelerated rate, or whether there is a true pathological change. Amyloid degeneration is also found in autoimmune disorders and it may be that in Alzheimer there is a faster clonal turnover than normal, ending in clonal exhaustion and consequent reaction against cells which have become immunologically "not-self". Amyloid also occurs in chronic sepsis and in extensive malignancy, and one can see that these, too, might accelerate immunocyte exhaustion, but the puzzle is that these conditions do not usually lead to Alzheimer's disease.

Nevertheless, the most rewarding research into the disorder would probably be from the immunological point of view, for it might clarify not only our ability to detect and prevent it, but also increase our understanding of ageing processes generally and their relation to genetics.* This book would give invaluable background information for anyone proposing such a study.

C. A. CLARKE

Department of Medicine, University of Liverpool

MODERN TRENDS IN HUMAN GENETICS—1. *New Connections in Medical Genetics.*
Edited by A. E. H. Emery. Butterworth & Co. (Publishers) Ltd., London, 1970. Pp. 379.
95s.

One could hardly hope even in 13 articles to cover the whole of the expanding field of human genetics. This book therefore wisely confines itself to the more medical and even clinical sides of the subject. It shows us the impact of biochemistry, immunology and chromosome studies on human genetics and the resulting impact of human genetics on reproductive and

* Amyloidosis of Alzheimer's disease: A clue to ageing. *Lancet*, ii, 1970, 598.

eugenic problems. It introduces evolutionary ideas at least at the chemical level. But it leaves out all psychological and some chromosomal genetics and it avoids most anthropological and ecological, historical and social problems. The editor is thinking first of the laboratory and the hospital. He is also thinking of the postgraduate research worker with his thesis and his need to quote (if not to read) original papers. What is the result? As usual in such combined works, it lacks a few pages that would show the reader its general connectedness. Even a note explaining its main division into molecular, cellular and individual sections would have helped. For under these headings more connection appears than the widely separated contributors could possibly have recognised. Let us see how this could be done.

First comes the molecular section. The genetic regulation of protein production is an old enough idea, but as presented by Boyer, Hopkinson, and Schimke and Kirkpatrick it takes on new relations to our knowledge of chromosomes. It appears as evidence of duplication at meiosis, of amplification in oöcytes, of reduction or diminution in development, and also of inactivation or dosage compensation of heterochromatin in the heterozygous sex. And even the B chromosomes of other animals and of plants may take a place in this series. At the same time we see the evidence of bacterial genetics on its way to being combined with the chemical cytology of higher organisms. We also see the polymorphic situations which arise in the course of evolution beginning to throw light, for example, on the character of the immunoglobulins.

It is not the business of this book to discover or record historical connections. It is therefore a pleasant surprise when we find so much of them in Davidson's account. Here we can see how the development of mammalian cell cultures led to the fusion of biochemical and chromosome techniques with the mutational devices earlier derived from the fungus *Neurospora*, themselves to be clarified in their turn by the Lyon hypothesis of X-chromosome inactivation in the mouse which itself can trace its origin from the genetic understanding of the tortoiseshell cat.

Next comes the cellular and chromosome field. Here the need for combining observations and ideas is most severely felt. For the chiasmata which hold, or fail to hold, chromosomes together at meiosis are also connected with the crossing-over between them which leaves its evidence, on the one hand, in linkage and, on the other hand, in the production of chromosome anomalies of whole individuals and also of mosaics. Edwards and Fowler describe the most remarkable advances in the study of these connections. But at this point we also need to refer to the wider field of animal mosaics recently reviewed by Stern and owing so much to Fankhauser's experiments with *Amphibia*. Again the statements of Kjesler on meiosis need to be considered (and reconsidered) in relation to other mammals. For there are certain rules about meiosis. And Sanger and Race need to ask themselves whether 200 units of crossing-over between X's are compatible with Kjesler's 2.2 chiasmata for autosomes; or with the opinion that man, unlike other mammals, has no chiasmata at all between X and Y.

When we reach the level of individual genetics, studies of the foetus have suddenly been transformed from an academic problem to become the basis of a practical and even, most strangely, a non-controversial eugenics. The account by Emery therefore attaches itself naturally to the work of Carter

in genetic counselling. Two points in this series of papers are worth noting. First, the newly discovered use of fluorescent dyes for the instant recognition of the Y and perhaps other chromosomes is likely to change the face of general genetic diagnosis and of sex diagnosis from amniotic cells. Secondly, there is the question of the identity of twins. It is assumed (p. 325) that, only 32 per cent. of one-egg twins being concordant for clubfoot, the environment is responsible for the 68 per cent. of discordance. But do we not know that the cytoplasm of the egg is asymmetrical? And that the developmental environment of the one-egg twin seriously differs from that of any single embryo? Because Galton and Newman made certain simple assumptions we are not obliged to ignore the later evidence.

Finally a word about style. This book ought to be read outside the field of medical or human genetics. It deserves therefore to be well written and well edited. But it has some bad patches. Are leucocyte antigens so trivial that their main technical problems can be pushed into a footnote under the first sentence (p. 104)? Do we need (on the same page) to "quantitate the amount" of antigenic disparity? Hopefully (p. 162), or rather we hope, not. Is inoculation (p. 168) another of these modern trends? And why is this field so bedevilled with major problems? Why no minor problems? Or just problems?

The little faults of style go with a bigger one: the failure of several contributors to explain or even see the wider bearings of their studies. One wider bearing is worth mentioning. It is continually appearing that groups of genes can be defined which are mutually adapted for their effect on a particular process or structure of an individual or a race or even a whole species. Such adaptive groupings are properly known as complexes or super-genes or perhaps *gene systems*. But some biochemists evidently prefer to call them *genetic systems*. These however are something different. A genetic system is a property of a genetic species. It is the result of genetic coordination by mutual adaptation of the whole of its structures and functions concerned with heredity, development and reproduction. Its causes need not be defined or definable as genes; none-the-less its causes and its consequences are clearly genetic. Gene systems and genetic systems therefore belong to different stages of analysis and different levels of ideas.

Despite any such shortcomings this is a valuable book. How valuable will appear when other books come to be written about its subject and with its help.

C. D. DARLINGTON

Botany School, South Parks Road, Oxford

ESSAYS IN EVOLUTION AND GENETICS IN HONOR OF THEODOSIUS DOBZHANSKY.

Edited by M. K. Hecht and W. C. Steere. North-Holland, Amsterdam. Pp. vii+594. 1952s.

This book is made up of a series of essays presented to Professor Dobzhansky to honour him on his 70th birthday. The papers in this volume are of very varied standard and outlook. The first gives a thumb-nail sketch of Dobzhansky himself, both in the laboratory and in the field. The sketch is quite delightful and those who had the honour of working with Dobzhansky in the laboratory or the field will greatly enjoy reading it. The reviewer's volume had this paper in duplicate, but I presume that this is not standard!