ANIMAL SPECIES AND EVOLUTION. Ernst Mayr. Oxford Univ. Press, 1963. Pp. 797. 70s.

Ernst Mayr's " Animal species and evolution " is itself a product of evolution for, in many respects, it is a natural outcome of his earlier work " Systematics and the origin of species ". But, like many evolutionary products, his earlier presentation has undergone remarkable changes—changes which reflect the mental meiosis and factual fertilisation which time has wrought in the author's ideas on the subject. The result is a mighty—almost encyclopædic—treatise which arranges and systematically analyses a prodigious amount of information on the species and its role in evolution.

The book begins by considering the biological characteristics of species (Chapters 1-6) and this is dealt with in a masterful manner for Mayr writes with considerable authority on such matters as species concepts, sibling species, species hybridisation and isolating mechanisms. Here one recognises the crystallisation of many years of personal experience with the problems at issue. This is followed by four chapters which deal with the genetic variation of populations and the factors which influence its quality and quantity. Two further chapters cover geographical variation and the concept of the polytypic species while Chapters 13-18 deal with problems relating to the structive, multiplication and kinds of species. Finally, in his two last chapters, Mayr considers the questions of transpecific evolution and the evolution of man.

Readers of *Heredity* will be particularly interested in Chapters 7-10 and 13-18 for it is here that the more genetical aspects of the situation are discussed. It is unfortunate, therefore, that in this reviewer's opinion, they are the least satisfactory parts of the book. True the material is presented in the same remarkably clear and comprehensive manner which characterises the remainder of the book. But the simple fact remains that Mayr's treatment includes a not inconsiderable number of value judgments leading to overdogmatic statements on subjects which, in the present state of our knowledge, must necessarily remain controversial. Indeed, by wooing the reader with such well-written arguments, Mayr is likely to persuade those who, like himself, have had little direct experience with many of the matters in question. This is particularly dangerous in an age when many spend more time talking about science than pursuing it and so derive their opinions (and their prejudices) second-hand. I do not wish to imply that the author is ever on the side of the wrong but simply that time may prove him to be on the wrong side. Three examples will suffice.

There seems little doubt that allopatric speciation has been much more common than sympatric speciation among most terrestial and fresh-water animals. But this need not imply, as Mayr does, that sympatric speciation never occurs in animals. As Haldane has pointed out it may well have been involved in free-swimming and floating marine forms, in stenophagous forms and in certain parasites. And the experimental evidence of Thoday and his students which suggests that disruptive selection may lead to sympatric speciation has been much too lightly dismissed. In fact, as readers of *Heredity* will be aware, E. B. Ford and his colleagues have recently produced some support for Thoday's findings from their own work on *Maniola jurtina*.

Again, those with genetical experience must surely raise their eyebrows at Mayr's claim (p. 236) that " linkage is a rather inefficient mechanism for

the preservation of genetic variation ". Indeed, despite this statement, Mayr subsequently (p. 544) attaches considerable importance to Harland's old claim—based on his studies in cotton—that species are characterised by their modifier genes. In Harland's original view each species was homozygous for a different set of alleles of the modifier complex, the various genes comprising each complex being unlinked. The subsequent work of Stevens, however, has given good reason for believing that these modifiers are borne in linked blocks within small structurally rearranged segments which protect them from the ravages of recombination. Evidently here—as elsewhere—linkage would seem to be anything but an inefficient means of preserving variation. Or perhaps, if it is inefficient, we should say of it as was once said of Harold MacMillan in his role of Prime Minister—" *It* (*He*) *is the best we have* ".

Equally suspect, I believe, is his conception of the role of chromosome change in speciation. Here he has leaned heavily on the work and opinions of M. J. D. White, himself a strong supporter of Mayr's ideas. But, although White has unquestionably made a marathon contribution to the study of chromosome conditions in animal populations, White (1954, 1959, 1961) can surely not be regarded as " all the known facts of chromosome variation " (p. 535). White for instance, has never taken into account the possible reciprocal action of the breeding system and the chromosome system though as Allard and Wehrhahn have recently shown some of his own data may find a more ready explanation in terms of such an interaction.

There are those who have a difficulty for every solution and since I do not wish to be numbered amongst them I will not persist with these or other issues. For, let there be no doubt, despite criticisms of the kind I have outlined above, Mayr's book is an enormously stimulating work which cannot be assimilated adequately in one reading or reviewed adequately by one reader. It is a scholarly, mature work. The sort of book one hopes for—and so often fails to get—from an elder statesman of Biology.

B. JOHN.

ECOLOGICAL GENETICS. E. B. Ford. Methuen, London, 1964. Pp. 335+xv. with 16 plates. 42s.

Few geneticists will be unacquainted with the outstanding investigations carried out by Dr Ford and his school into the nature and significance of variation in wild populations of animals, especially Lepidopterans. His approach through a combination of field observations with laboratory experiment has been most successful in revealing the interplay between genotype and environment, the dynamic nature of the population equilibria and the immense power of the selective forces acting in nature. To mention Ford's own remarkable investigations of *Maniola*, especially in the Scilly Isles, Sheppard's analysis of polymorphism in *Papilio* and Kettlewell's studies of industrial melanism in *Biston* is no more than to begin the list of striking work which we owe to the Oxford school and which is brought together in a single integrated account for the first time in " Ecological Genetics ".

The book includes chapters on chromosome polymorphism in *Drosophila* and on the heterostyle-homostyle system especially of primroses. It is,