Vertebrate History: Problems in Evolu- brate palaeontology. It does, however, dence from gel-electrophoresis. tion, (McGraw-Hill Series in Population provide an Maidenhead, 1974.) £8.75.

This is the most interesting book on those other textbooks provide. this subject that I have read, because it deals with the problems involved in understanding the course of vertebrate evolution. Most textbooks on vertebrate history are primarily accumulations of information on the structure and diversity of each group of fossil vertebrates, and are really textbooks of palaeo-osteology. Yet, for any reader, the interest of a subject lies in the problems it contains, in the lines of evidence available for solving those problems, and in the methods that can be used for obtaining and analysing that evidence. For example, the problem of the origin of the amphibians is not merely one of osteological modification; the papers that have discussed this studies of the embryology, life history and behaviour of present-day amphibians, the anatomy and physiology don and New York, 1974.) £2.15. of respiration, the ecology, climatology the nature and distribution of Devonian ponder to what extent they may or trees to the exclusion of the wood they make up.

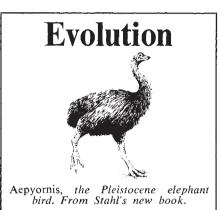
The book is divided into nine main chapters: fossils (their nature, disin early vertebrates: the first fishes with amphibians and their origin; the rise and fall of the reptiles; birds; and finally, two important questions—how fast has one third to one half of the text.

The chapters themselves are written in a style that is concise and enjoyable chapters, Dr Stahl has had to read and evaluate a large number of papers. The most important of these are listed in a titles (some as late as 1972), and there are 216 excellent figures.

as a source of information on verte- and concentrates too much on the evi- scope of this book.

Biology.) By Barbara J. Stahl. Pp. interested student to find out more pages are almost a grand build-up to ix+594. (McGraw-Hill: New York and without becoming surfeited by facts, the presentation of the answer to my and thus to come to appreciate the second question. The theoretical frame proper significance of the information

Barry Cox



subject also include opinions based on The Genetic Basis of Evolutionary Change. By R. C. Lewontin. Pp. xiii+ 348. (Columbia University Press: Lon-

and geography of the Devonian, and For Darwin, evolution was the conversion of variation among individuals sediments. Consideration of such wider within an interbreeding population into topics in turn forces the reader to variation between species and genera. The central ideas of molecular biology may not be relevant to the central did not have an immediate impact on question. It provides, therefore, a far evolutionary thought. They did change better methodological training than the our concept of mutation from a pronormal textbook description of the cess of shuttling back and forth between wild-type and mutant states to that of an infinite series of changes which almost never back-tracks. But the full impact waited on the development of that there is great difficulty in covery and investigation); the origin two experimental techniques: the deterof the vertebrates; bone and cartilage mination of amino acid sequences in peptides, and gel electrophoresis. These jaws; the rise of the modern fishes; the techniques provided for the first time quantitative answers in genetic terms to mammals. The mammals are thus cut evolution proceeded, and how much though recent evidence shows that ferdown to their proper status-in most genetic variation is there in natural tility differences are much more imbooks on vertebrate palaeontology, populations? The classical evolutionist portant. In my view, the great merit of which give a description of all the may object that the level of description the book lies in its critical discussion of diverse orders of mammal, they occupy has been changed from the important the present confusion and of the to the trivial—from morphological to biochemical differences.

Dr Lewontin has not only played a to read, and the concepts and questions large part in the development of theory that arise are clearly defined. The but was among the first to answer that we observe with these techniques format is attractive, with topic headings the second question experimentally, in only refer to a small part of the DNA, to the side of the text. In considering 1966, by showing that in wild populathe main problems raised in these tions of Drosophila there is probably The evolutionists have hardly faced up genetic variation at the majority of to the evidence now accumulating from loci specifying peptide chains; a finding the multiple-copy sequences, such as subsequently confirmed in many species the satellite DNA or those sequences well-selected bibliography of about 280 by other workers. This book derives which code for ribosomal RNA. I susfrom a series of lectures he gave in pect that the mechanisms that we shall Columbia in 1969 and, consequently, have to invoke for the evolution of this Dr Stahl's book cannot replace such perhaps suffers in structure. It is not as part of the DNA will lie quite outside textbooks as those of Romer or Colbert wide in scope as the title would suggest our present philosophy and outside the

opportunity for the approach is historical and the first 100 work is presented as an antithesis between two views. In the first of these -the 'classical' view-most of the genetic variation in populations is thought to be selectively neutral or harmful. Much evolutionary change may not have been adaptive but has resulted from the chance fixation of neutral alternatives. In the other view-the 'balance' view—it is held that variation is actively maintained in population by selective forces, although there would be disagreement about their exact nature, and that evolution proceeds by the active fixation of available alternatives at loci, with a gradual change of selection pressures over time. The necessary synthesis has not been achieved (though the author clearly leans scientifically and politically on the 'balance' side); Lewontin suggests that the profusion of facts which are now available for the 'theory machine' have merely led to "a great clashing of gears".

There are perhaps two main reasons for the present confusion. The first is that all wild populations have to cope with the wide diversity of environments, both in space and time, and we have neither an adequate description of these, from the point of view of the organism, nor an adequate theoretical treatment of their implications. The second is that differences in fitness between genetic alternatives may be so small (say of the order of 1% or less) measuring them adequately. This is particularly true for the measurement of fertility. With Drosophila far too much work has been concentrated on the measurement of viability differences, which is relatively easy to do, even validity, both biological and statistical, of some of the evidence that other workers have put before us.

But we must remember that the loci the 'single-copy' set coding for proteins. Alan Robertson