Book Reviews

The Ascension and Apotheosis of DNA

Molecules and Evolution. THOMAS H. JUKES. Columbia University Press, New York, 1966. 295 pp., illus. $8.50.

Evolution is, of course, a beguiling topic for discussion and a seductive area for research and creative thought. Those engaged in the latter enterprises are frequently imbued with a fierce enthusiasm, and sometimes with astonishingly inflexible views concerning the mechanisms of evolutionary change. Indeed, one might come to the conclusion that the last genuinely open mind observing and pondering evolution was Darwin's. Coupled with the now-indicated social respectability of and possible urgency for general discussion of evolutionary mechanisms, this enthusiasm has produced a spate of books and articles with some relationship to evolution. Often, however, that relationship is remote even though the titles would suggest otherwise.

What of *Molecules and Evolution*? The author points out that "Most books on evolution have dealt with entire organisms in terms of their structure, their separation into species, and their behavior as members of a population group." This acknowledgment is made on the first page of the preface, and except for a line or so here and there, it is about the total of Jukes's effort to place molecular biology in the context of our accumulated knowledge of evolutionary biology and interacting evolutionary mechanisms. Jukes's thesis is disarmingly simple: the integrity (or successful modification) of DNA base sequences is mediated by the natural selection of molecular systems operated by proteins, whose effective structure is determined by the translation of the DNA sequence according to the code. This is the credo for which the material presented by Jukes mounts a defense, and were it not for such assertions as "the purpose of life is the perpetuation of a base sequence," the reader unfamiliar with evolutionary concepts might not be aware that he has witnessed the deification of a molecule. The epilogue, a prose poem entitled "Man," leaves us in no doubt, however. It is a rather clumsy apocalyptic joke, which I fear, alas, was not intended to be a joke at all.

The scientific material documented in the book is, nevertheless, a compilation both interesting and useful to students of evolution. The summaries of research and the selection of data relating to the genetic code result in one of the better treatments of this subject. The presentation is spiced with a bit of evolutionary significance by the hypothesis that a primitive doublet code preceded and established the pattern of the accepted triplet code. The chapter dealing with molecular mechanisms and consequences of mutations is also excellent, and prepares the reader for a discussion of amino acid sequence proteins as indicators of evolutionary change. Here the evidence is convincing even though there are very few proteins which have been analyzed both for their sequences and for their phylogenetic affinities. Hemoglobulins and cytochromes *c* are the principal foci in this regard, and the illustrative material included is ample to make the point that proteins from more distantly related species have more disparate primary structures. Unfortunately, at this point of the development a few fine opportunities to say something meaningful about evolution at the molecular level have been missed or muffed. For example, one of the more fascinating facts associated with the cytochrome *c* story, as Margoliash and his co-workers interpret it, is that the changes have occurred more or less as a regular function of the elapse of time. This is not mentioned. Jukes interprets the differences between the cytochromes *c* of *Neurospora* and yeast, which are strikingly large in view of the fact that the two organisms are included in the same class of fungi, as being due to the rapid divergence of the two groups, which in turn is due to their rapid reproductive rate. This is debatable and possibly wrong on both counts. Such statements depend on knowledge of the time of divergence.

In a passing mention of immunochemical studies which correlate phylogeny with evolutionary changes in protein structure, Jukes has chosen an excellent example, an investigation of cross-reactions among eye lens proteins, but the findings he cites are trivial, very badly described, and totally unrelated to any other point made in the book.

In summary, Jukes gets high marks for his molecular biology, and evolutionists may find *Molecules and Evolution* a useful contribution. The rest of biology, however, is brushed aside as beyond the scope of the book. Unhappily, therefore, most of the relevant nonmolecular facts of evolution have been selectively eliminated. But then that's how new religions come about.

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Old World Monkeys

Primates: Comparative Anatomy and Taxonomy. Vol. 6, Catarrhini: Cercopithecoidea (Cercopithecinae). W. C. OSMAN HILL. Interscience (Wiley), New York, 1966. 806 pp., illus. $45.95.

This sixth volume of Hill's impressive monographic series begins with a general account of the Catarrhini, followed by a more detailed study of the Cercopithecoidea and of the genus *Cercopithecus* as representative of the Ceropithecinae. The second half of the book is a survey of every genus within the subfamily. The overall emphasis is again on gross anatomy, and to supply this information Hill relies on the work of other authors and on his own experience. He has incorporated a useful and interesting historical account of our knowledge of the catarrhine monkeys and apes, and, reflecting some of the recent trends in primatological research, the volume also contains data on the behavior, karyology, and hematology of these animals.

It is unfortunate that this very useful book is marred by the same shortcomings pointed out in reviews of the preceding volumes [see, for example, *Science* **140**, 631 (1963)]. The text still appears to have been carelessly put together, for it contains inconsistencies and factual errors, which cannot be enumerated here. There are many "references to literature"; several names,