THE ROLE OF STRATIGRAPHIC AND MORPHOLOGIC DATA IN PHYLOGENY

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ABSTRACT—Some systematists have asserted that stratigraphy is not a "trustworthy guide" to the relative ancestry of taxa, and that phylogenetic inference should be based solely on comparative morphology. Yet in many groups phylogenetic analysis is seriously hampered without stratigraphic information. Most deep-sea mollusks, for example, lack a sufficient number of taxonomically useful and conserved characters for cladistic analysis, and now frequent convergence and negative results. The high quality deep-sea stratigraphic record is, instead, the major source of phylogenetic data for these groups.

The importance of morphology and stratigraphy in phylogeny reconstruction depends upon the relative quality of the stratigraphic and morphologic data for a given group. We feel that the assessment of the quality of these data in phylogenetic analysis remains unsatisfactory, because some of the factors that can be empirically analyzed to make the choice of methodology more objective and reduce the chance of error include frequency of character reversal and intrusive evolution, geographic context, preservation quality, and proportion of correct stratigraphic sequence.

INTRODUCTION

PALEONTOLOGISTS HAVE traditionally touted the importance of time and stratigraphy in phylogeny reconstruction. Limited by the loss of morphologic information inherent in preservation of fossils, paleontologists frequently "assert the inviolability of our own, extensive turf-time" (Gould and Eldredge, 1977, p. 120). Any number of paleontologists could be cited to document this belief, but a statement by a well-known stratigraphic paleontologist sums it up well:

"The fossil record... is better than many people realize and it is of fundamental importance for understanding phylogeny. If paleontology were synonymous with morphology, fossils would be far less valuable than they are today. However, paleontology is an historical science, and the stratigraphical relationships of fossils give them unique importance in the study of phylogeny" (Gingerich, 1979, p. 74).

Recently, however, the importance of time and stratigraphy in phylogeny reconstruction has been challenged. Nelson (1969, p. 72) has stated that: "It is a general misconception that the problem of determining phylogenetic relationships among Recent animals can be directly approached only by the paleontologist. In reality, the paleontologist, even with a good fossil record, can contribute very little, if anything, to the solution of the problem. In fact, the paleontologist as a rule cannot do much in determining the relationships of his fossil species unless they are Recent relatives whose relationships are fairly well established."

Since ancestors can first occur later than their descendants, Patterson (1977, p. 625) has written that "stratigraphic sequence can never be a trustworthy guide to phylogeny, and paleontology must relinquish some of its claim to provide 'both, the most direct and the most important data bearing on phylogeny.'" Colless (1967, 1969), Kluge (1971, p. 27), Schaeffer, Heckel, and Eldredge (1972) and others have also emphasized that time is neither essential, nor desirable, in phylogeny reconstruction.

Rebuttals from stratigraphic paleontologists (Breisky, 1973, 1979; Campbell, 1972;...
You're asking about paleontological research, specifically about the methods and techniques used in paleoanthropology. The text you've provided seems to be discussing the methods used in reconstructing the evolution of human ancestors. The author mentions the use of strata and morphological analyses to infer the evolutionary history of early hominids. The text also touches on the importance of understanding the context in which these fossils were found.

For more detailed information, you might want to look into the specific journals or books mentioned in the text, such as those referenced in the bibliography. Additionally, you could explore the methodologies used in modern paleoanthropology, which involve the integration of data from various sources, including archaeological sites, ancient DNA, and other forms of evidence.

If you have any specific questions or need further assistance, feel free to ask!
purify the morphology method, failed in this example: when we consider the diversity of characters from one to the other, and not just the parsimony of the hypothesis, it is something to be emphasized that phylogeny in planktonic Foraminifera for...


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