Recognizing Ancestors Is a Species Problem

An anthropologist argues that the number of hominid species in the fossil record has probably been underestimated

Biologists have long argued about the proper definition of species, and, because of the nature of the problem, no doubt will continue to do so for a great deal longer. This confusion, which makes it difficult enough to recognize living species, renders the identification of species in the fossil record something of a nightmare. Ian Tattersall, of the American Museum of Natural History, now argues that recent theoretical and practical approaches to this challenge have led paleontologists "to underestimate the abundance of species in the primate, and notably the hominid [human], fossil record."

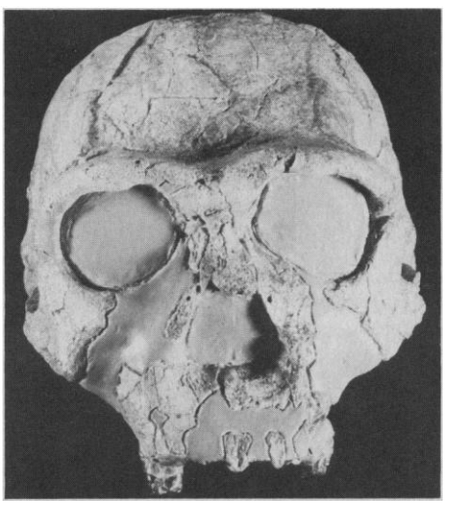
Tattersall's concern is that the patterns of evolution within the human fossil record will be obscured at best and obliterated at worst by the erroneous lumping together of many species within just one or a few. It is these patterns that, ultimately, paleoanthropologists seek to understand.

The exhortation to recognize more species in the human fossil record is, however, not the kind of message most researchers want to hear, for several reasons. One is the very real practical difficulty of drawing a line between one species and another, based on very limited anatomical evidence. A second reason stems from the history of the science. Until just a few decades ago there was a tendency, as Tattersall points out, "to baptize each new fossil specimen with its own name." The result was the existence of just about as many putative species as there were specimens, which clearly was nonsense.

Beginning in 1950, with an initiative by Ernst Mayr, this propensity for "splitting" was replaced by "lumping," so that anatomical differences between specimens were seen as variation within species, not distinguishing marks between species. For the most part, lumping has been the popular fashion ever since. "The triumph of the lumping ethic," is how Tattersall describes it. He argues, however, that "it would be better for the comprehensiveness of our understanding of the human fossil record that, if err we must, we err (within reason!) on the side of recognizing too many rather than too few species."

This shift from splitting to lumping in human paleontology reflected a change of focus from individuals to populations in the concept of species. For most biologists, reproductive isolation became a key criterion in recognizing a species. For paleontologists, says Tattersall, this biological species concept "opened the door to a host of practical problems when it comes to the actual interpretation of the fossil record."

At the heart of these problems is the absence of any consistent relationship between speciation and morphological change. In other words, the origin of a new species might be accompanied by a very striking change in anatomy, which can be identified in fossils, or by little or no change at all, which cannot. Therefore, the absence of any marked anatomical difference between two individuals does not necessarily mean that they belong to the same species. The problem applies to all vertebrates, but Tattersall notes that "If one surveys the primates as a whole, one finds that the morphological differences between closely related species . . . are commonly small, and restricted to only one or a few characters." Humans and their forebears are unlikely to have been any different from primates as a whole.



Early *Homo erectus*. *This 1.5 million-year-old specimen from Koobi Fora in Kenya is one of the earliest examples of* Homo erectus. *But is it the same species as those specimens called* Homo erectus *from half a million years later and more in Eurasia?*

Lumping among human paleontologists once reached the extreme position of suggesting that all hominids that existed at any particular time belonged to the same, highly variable species that gradually changed through time. It was a family tree with no branches. Now, however, the tree is perceived to have several branches, but is nevertheless rather simple.

The most primitive hominids, the australopithecines, formed the main stem early on, and then branched off in a cluster of two or three species, all of which became extinct. The other part of that main branch began with early *Homo*, which passed through *Homo habilis*, *Homo erectus*, "archaic" *Homo sapiens* to modern man. Opinions differ as to whether the Neanderthals were part of the main stem or were a side branch just before modern man.

In other words, the human family tree is typically represented a rather simple Y shape, with a few twigs: *Australopithecus* species going one way, towards extinction, and *Homo* towards us. Tattersall points out that just recently several researchers have begun to question the long-accepted notion that all large-brain hominids that lived between about 1.5 and 0.5 million years ago in Africa and Eurasia should be classified as the single species, *Homo erectus*. Several species of *Homo* might have existed during this time, he says, only one of which was ancestral to later hominids.

The real potential muddle, however, is in the period between 0.5 million and about 30,000 years ago, and relates principally to what is meant by "archaic" *Homo sapiens*. There is a series of African and Eurasian specimens from this period that are clearly different from *Homo erectus* and yet are also clearly not modern humans: the crania house big brains but are robustly built. The question is, do they all belong to the same "transitional" species?

It is true that modern human populations display a good deal of geographical variation, and yet are all members of the same species. And it is also true that, as ecological generalists, human forebears might equally have been widespread, polytypic, and yet members of a single species. But, says Tattersall, "Any mammalian paleontologist seeing morphological differences on the order of those separating modern humans from their various precursors, and the latter from each other, would have no difficulty in recognizing a number of separate species." Moreover, he points out that the tremendous climatic and environmental fluctuations of this period in human prehistory would have favored the establishment of reproductively isolated populations. ■

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ADDITIONAL READING

I. Tattersall, "Species recognition in human paleontology," *J. Hum. Evol.* **15**, 165 (1986).