Letters

Hominid Evolution

C'est magnifique, mais ce n'est pas la guerre. "It is magnificent, but it is not war." So said General Pierre Bosquet about the charge of the British Light Brigade at the Battle of Balaklava during the Crimean War. Traditional cavalry went up against more modern massed artillery; two of every three men who began the assault on horseback fell on the field of battle.

I suspect that there may be a parallel in the charge toward a more complex hominid phylogeny by the paleoanthropologists interviewed for the Research News article "New fossil upsets human family" by Roger Lewin (15 Aug., p. 720). The consensus shift from an already complex two-lineage phylogeny to a three-lineage scheme was occasioned by the discovery of KNM-WT 17000, a robust australopithecine from Kenya dated to 2.5 ± 0.07 million years ago.

Such increasingly complex multiple-lineage models of hominid evolution, requiring "incredible functional convergence," may turn out to be correct. However, some simpler model, making more allowance for within-population variation and between-population gene exchange, would be far more parsimonious. As for the position that, in the same broad time span and geographic area, "three separate suites of characters have each apparently evolved independently in different lineages at least twice and sometimes three times. . . ," *c'est magnifique, mais ce n'est pas la science.*

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The field of hominid paleontology continues to be dominated by personalities rather than by scientific evidence, as is illustrated by Lewin's recent article about the "new" WT 17000 skull. Rather than being "not predictable on the basis of current theory," the existence of WT 17000 is fully concordant with the published views of at least four paleontologists. In addition to Olson's work on comparative external morphology of hominid crania (*1*), work on comparative venous sinuses (*2*), on variation in the Hadar postcrania (*3*), and on frequencies of cranial emissary foramina throughout the hominid record (*4*) have led to the conclusions that: (i) robust australopithecines did not derive from gracile australopithecines; (ii) robust australopithecines are much older than previously thought, and (iii) robust and gracile australopithecines are probably both represented in so-called *Australopithecus afarensis*. In short, the simple two-pronged-fork picture of hominid evolution is quite alive and well and living in the extant literature. The "new" skull confirms the predictions formulated from various theoretical perspectives by a few workers in the field, that is, it suggests that the base of the two-pronged fork is further back in time than previously believed.

If there is compelling evidence for separating robust australopithecines into two parallel lineages (that is, establishing a third prong), it should be published and discussed in the context of inter-and intraspecific variation for robust australopithecines. The statement that no one could have predicted that an advanced (read derived) face would be combined with a primitive (read small) cranium is incorrect, as is the statement by Walker *et al.* (*5*) that the 410 cubic centimeter (cm^3) cranial capacity of WT 17000 is the smallest estimate of cranial capacity noted in the published literature for any adult fossil hominid.

Published estimates for adult specimen AL 162-28 (*A. afarensis*) range from 350 to 400 cm^3 (*6*) to 400 cm^3 (*7*), and a projected adult capacity of 352 cm^3 has been estimated for the Hadar juvenile AL 333-105 (*6*). These are the smallest published estimates of cranial capacities in the hominid record to date, and the limited available data (*6*) suggest that a small capacity is to be expected in an australopithecine dated at 2.5 million years ago.

In short, compelling theoretical evidence led a handful of workers to conclude that robust australopithecines are represented in the earliest part of the existing fossil record. These workers published their views in spite of the fact that they contradicted "current opinion." The fossil record has now provided evidence which supports these theories. The simple, most elegant interpretation of the hominid fossil record to date is that robust and gracile australopithecines comprised two separate lineages at least as far back as Hadar times (that is, over 3 million years ago). Splitting the fossil record as a result of WT 17000 is uncalled for and only confuses the picture.

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REFERENCES

1. T. R. Olson, in *Aspects of Human Evolution*, C. B. Stringer, Ed. (Taylor & Francis, London, 1981), pp. 99–128.
2. D. Falk and G. Conroy, *Nature (London)* **306**, 779 (1983).
3. A. Zihlman, in *Hominid Evolution: Past, Present and Future*, P. V. Tobias, Ed. (Liss, New York, 1985), pp. 213–220.
4. D. Falk, *Am. J. Phys. Anthropol.* **70**, 311 (1986).
5. A. Walker, R. E. Leakey, J. M. Harris, F. H. Brown, *Nature (London)* **322**, 517 (1986).
6. D. Falk, *ibid.* **313**, 45 (1985).
7. R. L. Holloway, *ibid.* **303**, 420 (1983).

Reproducing Results

Several decades ago, much of our work as scientists consisted of reproducing the research of other investigators and then going further. The detail in the methods section of a journal article was important, repeated exactly, and many investigators compared results as we pursued similar questions. Thus the stairs of a research career were made up of units of horizontal movement (reproducing others' results) and vertical movements (going further with one's own ideas, based on these results).

Much of this has apparently changed; reproducing the experiments of other investigators is no longer of primary concern. As our scientific universe expands astronomically, more and more detail is uncovered and more hypotheses are constructed. This exponential growth in new and interesting paths to follow has outpaced the growth in the number of scientists and in the funding for research. Who has the time, interest, money, or need to reproduce another scientist's results?

Another reason for the change is increased dependency on technology. Computer-assisted research is now the norm; data analyses and programs to run them are highly specialized and rarely published. Furthermore, the instruments and techniques used to make observations are sophisticated, complex, and expensive. How many laboratories can do high-voltage electron microscopy, nuclear magnetic resonance, or electron probe analysis? If you had one of these instruments, would you reproduce someone else's work? In other fields, is my monoclonal antibody the same as yours or did we both follow the same in situ hybridization protocols? Does it matter?

The implications of not reproducing experiments are severe. Much of what is published goes unchallenged, may be untrue, and probably nobody knows. Does anybody care? Do the methods used to obtain results matter any more? The foundation on which we based our research was other scientists' methods and results. Now the foundation is trust. Are you comfortable?

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