

Notes and Comments

Yes it is, . . . no it isn't: A Reply to van Vark and Bilsborough

Milford H. Wolpoff

Paleoanthropology Laboratory, Department of Anthropology, University of Michigan, Ann Arbor, Michigan 48109-1382

We have here a comment addressed to a reply made to a criticism (by a different author) of a letter published in *Science* responding to a letter by the comment's authors critical of a *Science* editorial about a paper read at national meetings that none of the corresponding critics attended. If publication in the *American Journal of Physical Anthropology* is not outright inappropriate, let me at least suggest it is bizarre. In fact, one wonders why this comment was not published in *Science*, clearly a more appropriate place, if any place can really be appropriate for discourse in which one group of scientists feel compelled to publicly lecture another on elementary statistics.

The gist of their comment is that multivariate procedures (the basis of many publications by both authors) have been validly applied in comparing variation of four partially complete specimens sampled from different populations across a time span of 60,000 years or more, with the variation of 2,216 recent individuals from 22 (sub)populations, and that the proof of this is found in the publications of the senior author, including the demonstration that the covariance matrices are equal. They clearly are convinced this multivariate approach is the correct tool for understanding human evolution in general, and in particular for comparing these samples, and remain critical of simpler, more assumption-free approaches. I searched publications of the senior author for this proof, and a discussion explaining why the assumptions they made in this comment are sound, and how an unknown covariance matrix was derived from these four individuals (or in their most recent comment

variably five or six, depending on the measurement), and on what basis the minute sample could be justifiably compared with the very large modern one. I found no acceptable solution. These multivariate techniques, derived to compare attributes of large samples of known composition and characteristics, cannot be applied to this question without making assumptions that presume the conclusions—a circularity similar to that in the Foote comment they allude to.

The only solution that van Vark has offered is an inapplicable one. He proposes a test to evaluate a null hypothesis (van Vark, 1984, p. 336), and uses it on several fossil samples, with sizes of up to 22 individuals. It would be best for me to cite his conclusions directly:

"We have applied this test to the groups tabled in Table 5 . . . No significant differences were found in this table. That is, no difference in variability could be demonstrated for the groups concerned. *This is no wonder because the sample sizes are very small. Even if important differences should exist they would not be detected*" (van Vark, 1984, p. 339: italics mine).

Now I ask, if a sample of 22 is too small to expect this test to uncover important differences, what can we conclude about a sample of 4?

van Vark has made several other attempts to use multivariate procedures to resolve problems raised by small fossil samples. For an example of just where this approach can lead, I cite his analysis (van Vark, 1983; pp. 151–152) of Middle Pleistocene hominid evolution. Using multivariate techniques to assess the pattern of variation, he interprets the results to show European and Asian lineages evolving independently but in parallel:

Received November 30, 1993; accepted February 16, 1994.

Address correspondence to Milford H. Wolpoff, Paleoanthropology Laboratory, Department of Anthropology, University of Michigan, Ann Arbor, MI 48109-1382.

These new results provide new evidence of the coexistence of two independent hominid lineages . . . [whose] . . . development seems to point to a more general tendency towards hominization, the driving force behind it . . . not being, so far, immediately clear.

How could two parallel and independent hominid lineages evolve the same way in their expression of hominization? So certain is van Vark of his interpretation—that the parallel regional patterns are the consequence of independent evolution and reflect the lack of genic interchanges—that he is willing to accept a blatantly orthogenic and quite unusual explanation for the common evolutionary direction:

Our hypothesis [is] in agreement with some ideas expressed by the astronomer Professor Fred Hoyle . . . 'the information content of life was not discovered by local process here on Earth, but was written on the Earth from outside, information that was derived from the past history of the universe.'

The problem that leads to this assessment is in one respect similar to that which forms the basis of this exchange—van Vark's multivariate approach is not meant to address

and cannot deal with the consequences of population admixture or other forms of genic exchanges.

In fact, exchanges of genetic and cultural information, not common influences from a cosmic source, are the most likely cause of similar evolutionary trends in geographically diverse human populations (Wolpoff et al., 1984).

I stand by what I have said and written on this issue. If my learned colleagues feel the need to continue their public lecturing, they will be doing so without further response from me on this topic.

LITERATURE CITED

- van Vark GN (1983) Did our *Homo erectus* ancestors live in eastern Asia? *Homo* 34:148–153.
- van Vark GN (1984) On the determination of hominid affinities. In GN Van Vark and WW Howells (eds.): *Multivariate Statistical Methods in Physical Anthropology*. Dordrecht: D. Reidel, pp. 323–349.
- Wolpoff MH, Wu Xinzhi, and Thorne AG (1984) Modern *Homo sapiens* origins: A general theory of hominid evolution involving the fossil evidence from east Asia. In FH Smith and F Spencer (eds.): *The Origins of Modern Humans: A World Survey of the Fossil Evidence*. New York: Alan R. Liss, pp. 411–483.