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Statistics of Ancestral Roots

My comment reported in Constance Holden's News Focus article "Were Spaniards among the first Americans?" (19 Nov., p. 1467) was a general, not a specific, comment on Walter Neves' interpretation of the hominid skeleton Luzia. Nevertheless, Neves' comment (*Science's* Compass, Letters, 11 Feb., p. 974) that he and his colleagues have "almost 15 specimens dated between 8500 and 11,500 years ago" is no contradiction of my statement in Holden's article that variation within (and, I should have said, intergradation between) racial groups today is so great that it is impossible to identify an individual's roots on the basis of sparse skeletal evidence. Multivariate statistics won't offset small sample sizes. Whether analysis is based on 1, or 15, or 30 individuals spread out over a 3000-year period, any attempt to assign them to a race is spurious: they do not constitute a

population, and there is not enough evidence to point conclusively to any original homeland or to affinities (other than coincidental ones) between them and modern Australians or Africans.

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A Question of Permanence

Scientific literature has a definite structure, a connectivity matrix consisting of citations from one article to previous articles. This structure was recognized by *Science* 45 years ago (1). In fact, *Science* took a leadership role by publishing several articles dealing with the literature (2-4). Publishers of online journals, however, do not seem to appreciate this inherent structure.

In Floyd E. Bloom's Editorial "Lunch selections expanding" (4 Feb., p. 801), he refers to the *British Medical Journal* policy of allowing authors to make changes in their online articles. Although this policy may be innocuous in itself, in the same category as meeting presentations, it would be disastrous to the literature

structure if these ephemeral articles are allowed to be cited. The inherent value of paper journals is that they cannot be changed once published. Any changes must be made in a subsequent publication. That way, an author citing an article can be assured that the information referred to in it does indeed exist exactly as it was read. If articles are ongoing works in progress, the utility of the published literature breaks down.

Articles may be cited many decades after they have been published (5). Meta-analyses are based on the permanence of their underlying articles. Current concern over such matters as peer review and format pale into insignificance if the basic integrity of the literature structure is lost.

Science has advanced because of its literature structure. Online journals certainly have many advantages over paper, but they must also preserve the basic advantage of paper—its immutability. Citation networks differ from hyperlinks, a point scientific publishers must keep in mind. I'm concerned that students today are getting the impression that if information is not available online, it doesn't exist. On the other hand, we old-timers think that if something is not published on pa-

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