

## Palaeoanthropology

# One source not many

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THE origin of anatomically modern humans has long been a problem in human evolutionary studies. But new results in both molecular biology and palaeoanthropology have made it a hot topic for debate. In a paper in last week's issue of *Science*<sup>1</sup>, C.B. Stringer and P. Andrews examine the contributions of both approaches to evaluate the two most widely argued models of recent human ancestry, as well as the systematic position of modern humans and our closest extinct relatives.

The argument centres on whether anatomically modern humans evolved independently in different areas of the Old World or in one particular region. The former view, the regional continuity model, is based on the assumption that some morphological characters have persisted independently in four or five regions for hundreds of thousands of years, with continuity maintained by gene flow and locally important (but poorly understood) selective pressures. Proponents of the opposing single-origin model have championed various source areas over the past century, but most now suggest sub-saharan Africa as the most likely homeland. In this 'out of Africa' hypothesis, the anatomically modern ancestors of all non-African peoples migrated into Eurasia around 100,000 years ago, replacing the established 'archaic *Homo sapiens*' occupants perhaps as a consequence of more 'advanced' technology or physique.

Stringer and Andrews formalize these two models in terms of their theoretical predictions about the human fossil record of the past 300,000 years. In all seven comparisons they tested, the out of Africa model agreed far more closely with current data than the regional continuity hypothesis. For example, if anatomically modern humans evolved in Africa from a population of archaic *H. sapiens*, the oldest fossils with modern features would be expected to occur in or near Africa, those found in Europe and eastern Asia being rather younger. On the other hand, if modern humans evolved independently in several regions, there should be no clear temporal pattern to their occurrence (or perhaps contemporaneity might be expected worldwide). The former pattern is in fact observed.

The earliest known anatomically modern humans come from eastern and southern Africa and are about 100,000 years old. The recent report (see ref. 2) of a 92,000-year-old anatomically modern population from Qafzeh in Israel, combined with a comparable date for another

nearly modern population at Djebel Irhoud in Morocco<sup>3</sup>, strengthens the case further. The southern African fossils are thought to show African regional features, while the North African and near-Eastern samples could represent elements of an ancestral Eurasian population at the point of entering the Northern Hemisphere. Modern humans are unknown from western Europe or Australia before about 35,000 years ago, when the fossils already have at least some regional characteristics



This comparison of (left to right) a Neanderthal from La Chapelle-aux-Saints, an early modern *H. sapiens* from Cro-Magnon, and another Neanderthal from La Ferrassie illustrates the problem of the origin of modern *H. sapiens* in Europe. These fossils all derive from caves or rock shelters in France, and the Neanderthal specimens may be only 10,000–20,000 years older than the Cro-Magnon (dated at about 30,000 years ago). Did the Cro-Magnon completely replace the Neanderthals, or was there substantial contact and hybridization between them during the period 40,000 to 30,000 years ago? (Courtesy of C.B. Stringer, by permission of Musée de l'Homme, Paris.)

(the interpretation that the archaic appearance of some Australian crania may be due to cultural practices of deformation rather than persistence of *H. erectus* features is gaining ground<sup>4</sup>).

Genetic and molecular data indicate a major dichotomy between most Africans and all other living humans (see ref. 4). Dates derived from such studies suggest a split more than 100,000 years ago, but these have been questioned on several grounds; my own hesitation relates to the documented variations<sup>5</sup> between the evolutionary rates of mitochondrial and nuclear DNA.

A third line of evidence (one not emphasized by Stringer and Andrews) is archaeological. The apparent similarity between some Neanderthal artefact assemblages and those associated with early anatomically modern humans such as at Qafzeh and Irhoud belies their anatomical distinction. Archaeological assemblages from southern Africa (for example, the Howieson's Poort and perhaps Pietersburg variants of the MSA) and the southeastern Mediterranean (for example, pre-Aurignacian) which may be more than 90,000 years old include arte-

facts strongly reminiscent of Late Palaeolithic forms but cannot yet be unequivocally associated with human fossils. Perhaps the delay from 90,000 years ago to when anatomically modern humans dominated the Old World was due not only to the time it took to dislodge the successfully adapted Neanderthals and their contemporaries<sup>2</sup>, but also to the time required for the full development of Late Palaeolithic technology and its spread throughout modern *H. sapiens* populations.

Finally, Stringer and Andrews restrict usage of the name *H. sapiens* to anatomically modern populations only, as opposed to a wider usage encompassing Neanderthals and other archaic forms as subspecies. If one or more species of middle

Pleistocene *Homo* is recognized between *H. erectus* and *H. sapiens*, this emphasizes the unique origins and distinctions of the latter. On the other hand, it also clouds the apparent continuity of all varieties of *Homo* in the later Pleistocene and may lead to recognition of greater taxonomic distinction among living humans than is warranted. Study of the morphological diversity within modern populations by comparison with intragroup variation of Neanderthals and other archaic humans is now needed to determine whether these populations are best placed in separate species or retained within a temporally and geographically polytypic *H. sapiens*, as a valuable legacy of the regional continuity model. □

1. Stringer, C.B. & Andrews, P. *Science* **239**, 1263–1265 (1988).
2. Stringer, C.B. *Nature* **331**, 565 (1988).
3. Hublin, J.J. in *Proc. II Int. Congr. hum. Paleont.* (ed. Giacobini, G.) (Jaca, Milan, in the press).
4. Wainscoat, J. *Nature* **325**, 11 (1987).
5. Vawter, L. & Brown, W.E. *Science* **234**, 194–196 (1986).

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