

**An image of human evolution from biases and levels of evolution<sup>1,2</sup>**

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Received 4 September 1993

The origin and spread of anatomically modern humans is both highly polarized at present and a somewhat emotionally charred (as well as charged) subject. A laconic controversy from the 1940s was knocked into prominence in the 1980s, as it was in the 1960s but even more so. Unfortunately, students of the debate tend to take a stand and then work assiduously and somewhat blindly to support it. Although a great deal of factual evidence and sometimes useful new tools emerge, intellectual progress is damped. (And dampened by the cold water thrown on it?) Few are willing to accept that both polar views may be wrong, with each having elements of the truth. Here I discuss cultural and scientific aspects of the controversy and propose a potentially unifying conceptual framework.

**Mitochondrial DNA and other genetic evidence**

Most of the genetic evidence suggests that the latest common ancestor of modern humans lived about 200 kya (with large error) and that Africans are more diverse from one another. That Africans are more divergent from other peoples is now equivocal. While this is consistent with the view that Africa was the site of origin of modern peoples, it can equally mean that Africans simply became isolated from other modern humans at an earlier date or were more divergently selected, or had more opportunity for genetic drift. It is interesting to note in this context that the widespread use of hearths and caves as permanent dwellings did not occur in Europe at least until about 200 kya; whether this timing is coincidental is unknown. The archaic *Homo sapiens* of the time may simply have settled down and not wandered as far, thus not mixing their genes as widely. A previous population, genetically coherent

<sup>1</sup>**The Human Revolution.** Behavioural and Biological Perspectives in the Origins of Modern Humans.

Edited by Paul Mellars and Chris Stringer. 1989 (8 November). Princeton University Press. xi + 800 pp. Apparently acid paper. ISBN 0-691-08539-0. Hardbound. \$65.00

**The Emergence of Modern Humans: An Archaeological Perspective.**

Edited by Paul Mellars. 1991 (29 April; stated 1990 in book). Cornell University Press. xi + 555 pp. Apparently acid paper. ISBN 0-8014-2614-6. Hardbound. \$65.00.

**The Emergence of Modern Humans: Biocultural Adaptations in the Later Pleistocene.**

Edited by Erik Trinkaus. 1990 (June; stated 1989 in book). Cambridge University Press. xv + 285 pp. Apparently acid paper. ISBN 0-521-37241-0. Hardbound. \$49.50.

**The Origin of Modern Humans and the Impact of Chronometric Dating.**

Edited by M.J. Aitken, C.B. Stringer, and P.A. Mellars. 1993 (10 May). Princeton University Press. vi + 248 pp. Acid-free paper. ISBN 0-691-03242-4. Hardbound. \$39.50.

<sup>2</sup>Contribution 115, Lothlorien Laboratory of Evolutionary Biology.

Evolutionary Theory 10: 187-194 (September, 1993).

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despite its wide range, began to diverge regionally. Sub-Saharan Africa is a cul-de-sac with respect to easy travel and thus may have become isolated earlier from the rest of the Old World. If we can ever get some mtDNA from Neanderthals or other relevant molecules, we might even find that they are less divergent than are some modern Africans.

#### Fossil record of hominids

Neanderthals can be interpreted as being no more archaic than so-called early moderns of the same age – only more specialized in craniofacial morphology because of apparent extensive reliance on or use of teeth as tools and perhaps more robust postcranially for muscular development. Referring to Neanderthals as archaic, mainly because they are robust and not because they are actually primitive or more ancient than moderns humans are claimed to be, accentuates a bias toward accepting them as ancestors to at least some populations of modern humans. "Early moderns" and Neanderthals appear at about the same time in the fossil record, although earlier hominids in Europe seem to anticipate Neanderthals in several characters. Early moderns from Africa and the Near East may appear less different from extant humans because they lack this distortion of the face, they may not have been genetically any closer than the Neanderthals. The Skhul and Qafzeh fossils from the Near East bear more resemblances to Neanderthals than to African fossils of the same age. It could be that a widespread trend toward gracilization of hominids began about 100 kya or even before, because cultural changes such as good control of fire allowed habitation of caves, and thus a reasonably sheltered existence, for the first time. For a while where climatic conditions were severe a more robust, but not necessarily archaic, physique was adaptively superior. Over time, cultural intervention mediated and selected for a more gracile form that energetically and nutritionally cost less to raise and maintain.

So many stories can be told from data on hand at the present time. In some ways, pushing back in time the origin of the Skhul and Qafzeh fossils only adds coherence to a story not yet told. After competent control over fire, early humans could begin to inhabit caves that provided shelter and continuity between generations. Traditions could grow as well as superstitions. The archaeological record suggests that this change occurred during the cultural transition between the Early and Middle Paleolithic, at a time roughly corresponding to the transition between *Homo erectus* and *Homo sapiens*. Why we should also need to create a new type of hominid for the transition to the Upper Paleolithic is puzzling, because that implies that each major advance since the early Ice Ages was accompanied by a new type of human. As recently as 30 to 40 kya such a proposition seems ridiculous, or does it?

The inferred behavior of the early moderns does not indicate any important differences from their morphologically more specialized contemporaries. This leaves the matter of the origin of the Upper Palaeolithic or Late Stone Age cultures as much a mystery as ever. There exists at this time no reason to suppose that their creators had to have been descended from these African or Near East early moderns; they could well have been at least partly from some Neanderthal population which may or may not have lost the extreme specialization. At least this possibility cannot be ruled out.

Negative evidence does not help the cause of linking modern culture

with modern morphology; the issue can only be resolved when we find some direct evidence for the morphology of the creators of early 'modern' culture. They need not have been very modern in appearance since morphology has not been closely linked to mental ability. In fact widespread gracilization of the skeleton, one of the key traits of modern humans, may have been fostered in areas of extreme cold by a more sophisticated culture invented by more robust ancestors. Good Neanderthals in Europe were gradually becoming more gracile in some features until their disappearance or their transformation into something not recognized as Neanderthal (see Smith et al. in Mellars & Stringer). What can be achieved now, however, would be a more detailed comparative study of 'modern' hominids from various parts of the world before, say, about 20 kya. How similar were these hominids from Europe, Africa, Asia and Australia? Can they really be invading populations from some place that completely wiped out more robust sorts of humans?

There seems to be more attention paid to limb proportions of moderns as indicative of a tropical origin than to degree of facial prognathism. The former can be related to climate while the latter is mostly attributed to culture. Not discussed in these volumes, or much elsewhere, is that limb proportions are not only correlated with climate but can also be related to time of sexual maturity, among others causes. Anatomically moderns may have appeared in widely spaced areas of the Old World at the time that cultural innovations, which can spread faster than genes by notoriously mobile humans, selected for more gracile, long-limbed types, a type that dominated later populations for a variety of possible reasons. Earlier and scattered appearances of gracile, modern-looking humans might represent some localized selection for gracility. Ever since *H. sapiens* emerged, perhaps around 200 to 400 kya, some populations may have been getting more gracile while others like the Neanderthals became even more robust at the beginning of the Würm glaciation, a response to severe climate with a still primitive culture. No detectable changes in brain size unrelated to changes in body size have occurred since that time, but culture began to change significantly even before the so-called revolution about 30 kya. After *H. sapiens* appeared, earlier, evidence for the controlled use of fire becomes definite and new techniques for making tools, such as the Levallois, appear. Scrutiny of this transformation of *H. erectus* and *H. sapiens* promises to be as interesting and controversial as that of later humans. Perhaps research on this earlier transition might clarify controversial issues in the later one.

#### Archaeological record

As paleoanthropologists have done with the fossil record, archaeologists have taken the same artifacts and derived very different conclusions about the course of human evolution from them. A major problem with the archaeological record is that more sites are known than fossils of the hominids that left them. Uncertainty exists then about the morphology of the creators of various industries, despite a widespread tendency to equate morphology and behavior (perhaps a leftover of European ecocentricity). European paleoarchaeology and -anthropology are plagued with this problem because so few of the early Upper Paleolithic sites contain hominid remains, particularly those of the early Aurignacian culture. This culture differs more from the middle Paleolithic Mousterian than do other early Upper Paleolithic cultures such as the Châtelperronian or Szeletian, the former of which is definitely associated with Neanderthals, who are variously claimed to be less or not less robust

than earlier ones in the region.

A widely held assumption in these books is that the Upper Paleolithic was produced by anatomically modern humans, despite lack of concrete evidence, but that when such humans had first appeared they had possessed good Middle Paleolithic cultures that cannot be distinguished from those of other hominids existing at the same time. Morphology is hypothesized to have preceded behavior or maybe even the Middle Paleolithic cultures of anatomical moderns held glimpses of the revolution to come some 50 or more thousand years later. That culture itself could have been the selective force to create a new morphology has not been widely postulated although the evidence is just as suggestive, especially in Europe, where the best record exists for both fossil and cultural changes over time.

If modern humans can create very distinctive cultures, tools, etc., why not earlier ones with the same brain capacity? Why could not a Neanderthal in eastern Europe 'invent' the Aurignacian and spread it to the west where its advantages superceded the Mousterian and perhaps even influenced some changes in the Mousterian of the area (or perhaps the Châtelperronian was an independent invention)? Meanwhile, a warming interval and greater control over culture favored gracilization and the emergence of modern human types. Presumably still there was a considerable degree of travel and mixing of genes, so new elements from elsewhere may have influenced the emerging European type, which may not have become distinct morphologically until long after the emergence of a new cultural type. There is nothing yet to indicate that Neanderthals could not have created and spread the early Aurignacian.

#### **Theoretical behavioral and ecological models**

Good replacement models for a small population of African origin have yet to be presented. The attempts found in these volumes are not very adequate, as some authors point out but the majority ignore. It is plausible from a genetic viewpoint to postulate replacement as an explanation for the data but considerations of the lives and distribution of hominids at the time makes this difficult. Populations were sparse and retreat to less favorable sites was a possibility. Currently in Europe and elsewhere there exist remnants of older cultures, such as the Basque, that are little influenced by later civilizations surrounding them. Some archaic humans should have survived the Ice Ages and perhaps even exist today in remote areas.

Moreover, a major objection to Neanderthal origin of modern humans in Western Europe is the potential overlap in time although not in place. Some Neanderthals could well have persisted with little change while neighbors were fairly rapidly transforming into modern humans not so far away. One cannot simply assume that the last appearance of one type of hominid in an area and the first appearance of a different type at nearly the same time precludes *in situ* evolution of the former into the latter. Pockets of the earlier form can be expected to persist and separate evolution should only reinforce their isolation.

The need to search for a cognitive element to the Upper Paleolithic transition smacks of the last chance for 'special creation' of a new type of being. For many years, the European record suggested that a new culture was associated with a new type of hominid that appeared from nowhere traceable. When possible ancestors were traced to Africa, and even southern Africa at that, and these modern-looking hominids were only associated with primitive culture for many tens of thousands of years, something other than external

morphology had to be found to account for modern human superiority.

Language is now the favored difference that separates modern humans from archaic ones. Neanderthals are thus considered incapable of the sophisticated culture of moderns, which contains more sheer symbolic elements than any earlier ones, because the Neanderthal vocal apparatus is thought by some to be unable to provide the full range of sounds that moderns can. Yet a complex language can be produced from few sounds. Modern languages themselves differ in the range of sounds employed and there is no known correlation between complexity of culture and language complexity. Ability to produce a wider range of sounds and thus potentially even more complex language is one element that can conceivably be linked to modern human morphology; the link between a more complex language and a more complex culture is itself debatable, and both are issues yet to be resolved. It is problematic now that the latter link has become an assumption for many workers in the field and thus evidence for it is not really sought.

The gulf between the Middle and Upper Paleolithic is still widely perceived as being too large to be created by a hominid with a brain capacity at least as large as that of modern humans but with a more robust build. Many archaeologists fail to find a cultural discontinuity but the belief persists in many papers in these volumes. I find this most puzzling, since the Industrial Revolution or even the Computer Revolution today has been more profound in consequences than what I can fathom of the Upper Paleolithic one. Yet one does not claim that 20th-century humans are different from 19th-century ones in any fundamental way. It is time for human evolution to be examined from an objective point of view rather from that of still trying to find a particular point in time when we stopped being animals and became something different and special. Biases will always cloud our study of history, whether our own or that of other animals, as Clark and Lindley point out in their article (Mellars and Stringer), but they do not need to be as unrealistic as the ones I perceive in these and other recent collections of articles on our origins.

Could it be that the source of the controversy stems from a species that is too mobile and yet too sedentary for the fragmentary remains to tell a conclusive story? We really don't know much about the behavior of ancient humans, but among people today there is considerable variation in a desire for travel. Some are reluctant to move beyond the borders of their home town while others wander the world with little interest in settling in one place. Such behavior can cause confusion because we cannot ever be certain that a particular individual was born anywhere near where it died and was buried. We badly need populations of specimens to pinpoint human variation in time and space. Moreover, the fragmentary nature of most fossils hampers their comparison over space and time because few critical diagnostic traits are present on all. So we may never be able to write a Pleistocene history of humans with any certainty.

#### **The books themselves**

Much ado about nothing might be a conclusion reached from reading recent literature on modern human origins. Public media coverage of this issue, which is sometimes thought to have potentially profound political ramifications, has confounded the controversy. Objective, unbiased inspection of fossils and artifacts becomes difficult when the public wants to

know how modern humans evolved. The Piltdown hoax existed because it reflected what most humans wanted to believe; the papers in these volumes also seem to comply with a desire to support one end of a controversy over another because it fits better our current perspective of what we are.

The last decade has seen numerous conferences on the issue of modern human origins, sparked by new evidence from the genes to add to that of fossils and artifacts, of which there has not been many recent finds to illuminate the issue. Only a few of the proceedings from these conferences are discussed here. Those omitted are not much different in content, lack of conclusive answers, or failure to define future research goals. The aim seems to be to prove either that certain hominids, more anatomically like those living today, replaced all of the more archaic forms because of a superior mentality that produced a superior culture unlike the world had previously seen, or that they did not. The goal is either to demonstrate a link between a more gracile, modern-looking form and the appearance of the Upper Paleolithic culture in Europe or the Later Stone Age of Africa (cultural transitions elsewhere are not much dealt with, mostly because of lack of primary evidence in the form of artifacts), or the absence of such a link.

The authors of the first two books, which resulted from a symposium organized by Mellars and Stringer, mostly present detailed, well-documented articles that will stimulate further research for a long-time. Like most symposium-derived articles they focus on interpretation rather than presentation of data but they do document the sources of information on which they are based. These volumes will be a gold mine of information for a long time to come. The volume emerging from the seminar organized by Eric Trinkaus was well done and engaging to read. It was more focused around a set of questions and problems and thus the papers are more integrated than those in the symposium volumes. The fourth volume, from a discussion held several years later than the others, was disappointing in not reporting much progress in the controversy. The papers are well written and well documented and well argued but they seem stuck in the same rut of the earlier volumes. The participants in this discussion, moreover, are almost entirely people who have in earlier work favored an African origin of modern humans.

Our entire perception of human evolution is typically and almost unavoidably colored by our projections on the past of our current theoretical and social biases (mindsets). Every treatise on human social, intellectual and cultural evolution that I have read, is warped by assumptions of what human ancestors were like at various times in the past. These biases even intrude upon a seemingly straightforward inquiry into the origin of anatomically modern humans, the last and most 'refined' of all known hominids. On many issues, scientists can offer convincing arguments for anything they want to demonstrate by judicious selection of available facts. Such practice highlights the volumes discussed here. The expected but lamented conclusion is that we are not much further ahead in our understanding of modern human origins and cultural evolution than we were prior to these studies. They highlight inadequacies and gaps and provoke questions about potentially relevant topics not even mentioned. New approaches to the problem are suggested by these numerous studies though. The most important general change of attitude is asking whether the underlying assumptions are correct and what would be expected if they are not. I have tried to illustrate this above by commenting on each broad category of paper and suggesting alternative interpretations.

Facts emerging from the various volumes about the fossils themselves let us infer that the oldest 'modern' humans in Africa, which are reasonably securely dated, are not all that modern in many specifics of their morphology, in their high degree of sexual dimorphism, and in their behavior. Those Near East specimens that are also 'modern' in appearance and relatively ancient do not have special resemblances to either the African specimens or to the earliest modern humans in Europe. The early Australians can be interpreted as non-modern by some definitions of 'modern' humans; they bear little resemblance to contemporaneous Africans but might resemble some east Asian specimens. Currently, the east Asian fossil record is too fragmentary or poorly dated to add any resolution to the controversy. Europe has perhaps the best record and, at least in the east, Neanderthals grade into modern humans, but on both sides of the controversy these fossils are being variously interpreted. As an outsider in this matter, I want to see more details discussed so that I can evaluate them independently. At this time, the most factually convincing argument is against replacement by an African modern ancestor. The arguments of the proponents of multiregional evolution more frequently tend to be backed by masses of what hard data there are than do those for replacement, which tend to be rather skimpy. To convince, one has to lay out the evidence to be reviewed. In over a thousand pages of print, there is more argument and assertion than presentation of facts bearing on the issue.

#### Levels of evolution

The dichotomy of opinion played out in these papers can be interpreted as a controversy between levels of natural selection. On the one hand there is individual selection, with predominant continuity of biological populations and cultures; change comes about here mostly by differential fitness of individuals and of cultural variants. On the other hand there is group selection, where the relevant fitness differences are among whole groups (at one level or another), with the biological and cultural traits of a group inextricably joined in contributing to the group's fitness. Both sorts of selection occur commonly, even among humans today, and neither is inherently implausible for our ancestors. It is important to note, though, that they can be combined in several ways, so they are not mutually exclusive choices. Evidence for or against one aspect of one kind of selection may be irrelevant to another aspect, and they may also vary over time and space.

Group selection arguments as such have failed to provide any reason for the origin of anatomically modern humans. They emphasize that the oldest specimens now known (Klasies River Mouth in southern Africa) come from one end of the Old World, but these fragments suggest a large degree of sexual dimorphism not compatible with the closest human relatives among the apes, but the degree of sexual dimorphism in earlier hominid populations is unknown or controversial. It may well also be large. Moreover, the fragments do not indicate full entry into modernism; some eastern European Neanderthals are equally as modern for the traits that can be observed. Latitudinal clines in traits occur now so why not 100 kya ago? What needs to be modelled are reasonable changes in archaic *H. sapiens* with climate. Also, how fast can morphology respond to a change in climate and diet? The last century or more suggests quite a bit from environmental causes. Even Europeans continued to change in tooth size and gracileness from the peak of the latest glaciation to now. Better nutrition has increased body size over the last century and I

think body proportions and gracileness may be increasing with less need for continuous hard physical labor.

Some puzzles continue to plague me but are beyond the issues addressed here. One is the spread of agriculture, particularly in the New World (not conclusively inhabited before about 12-14 kya) long before its first documented occurrence in the Near East. Were the elements known before, and only occur when the appropriate environments invoke them or was there a later tranfusion from replacing migrants later in time, or were there multiple origins in time?

Being locked into extremes has influenced the ways researchers have examined and interpreted their data. The same fossils and the same sets of tools can produce convincing arguments for opposite conclusions depending on the assumptions put into the analysis. At this point I recommend abandoning this line of thought entirely, collect more fossils and artifacts if possible, and continue to work on dating them more accurately, and above all, sitting back to examine what is there now and framing new ideas to argue about. Modern humans really are not very special physically, although we keep liking to think they are. Over historic times this sense of superiority is correlated with technology; the Palaeolithic record seems to show a technological edge of Europe during the Upper Paleolithic. Might there be something about the Neanderthals that might want us to claim ancestry rather than deny it? If there is the least remnant of their former individualism and artistic and scientific creativity in the modern inhabitants of Europe and west Asia, I am proud to be a descendant only 30 kya removed. This time span is less than the duration of the Middle Paleolithic, which swept the entire inhabited world with tool innovations as novel as many of those of the Upper Paleolithic without any controversy among recent anthropologists about who created this culture.

Natural selection occurs among ideas, tools, mating customs, brains, legs, livers, and most anything else. So does drift, but drift predominantly erodes adaptation while selection increases it. (Selection increases adation to the *environment* only if the selection is by the environment, directly or indirectly, and not, e.g., for sexual attractiveness or fecundity.) Different processes may well have predominated in different aspects of human evolution, as is true today. We therefore need to consider each aspect on its own merits. Perhaps the conceptual framework suggested here will help.