The Mythical Moderns

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Abstract Based on the most current information available on the Late Pleistocene palaeoanthropology of Europe, this paper presents a revolutionary reassessment of the dominant models. The notions of an introduction of African technologies and the full replacement of resident robust hominins are rejected. It is demonstrated that there exists no evidence that any of the Early Upper Palaeolithic tool traditions, including the Aurignacian, were by 'anatomically modern humans'. The introduction of hominin gracility, in Europe and in three other continents, occurred gradually, over a period of several tens of millennia. What were replaced were not entire continental populations, but robust genes in humans, through genetic drift, introgression and cultural selection of gracile traits, initially in the females. Therefore 'anatomically modern humans', which were preceded by cognitive modernity, are the result primarily of incidental selective breeding.

Fundamental to any consideration of the evolution of human cognition, symboling and many other related developments is the time frame in which it may have occurred. But while there is reasonable consensus, at least in the very broadest terms, on the physical, especially skeletal, evolution of hominins, when we come to their non-physical development the disagreements could hardly be greater. Essentially, there are two schools of thought, described as the *short-range* and *long-range* theories, sometimes called the 'discontinuist' and the 'gradualist' models (d'Errico and Nowell 2000). These two diametrically opposed conceptions perceive two entirely different paths of non-physical human evolution. The *short-range model* rejects all evidence of symbol use prior to about 40,000 years BP, insisting that it commenced as part of the claimed cognitive revolution

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with the advent of the Upper Palaeolithic. This model coincides with the various 'Out of Africa' hypotheses, such as the 'African Eve' complete replacement scenario (Stringer and Andrews 1988), the 'Afro-European *sapiens'* model (Bräuer 1984, p. 158), the 'wave theory' (Eswaran 2002) and the 'assimilation theory' (Smith et al. 2005). The Eve model regards 'Neanderthals' and 'Moderns' as separate species, unable to interbreed, whereas the more moderate varieties accept the occurrence of mixing and therefore are merely variations of the multiregional theory (Relethford 2001; Relethford and Jorde 1999), claiming a strong inflow of African genes. All models of a reticular gene flow are in fundamental agreement with Weidenreich's original trellis diagram (cf. Wolpoff and Caspari 1996, p. 200–1). Nevertheless, what unites all these models is that they assume a quantum jump in cognitive evolution in Europe at the time of the arrival of these 'mythical Moderns' from Africa.

The *long-range model*, by contrast, perceives a gradual evolution of language, art-like productions, advanced hunting methods, shelter building, garment making, interment, social complexity, and of course the symbol use which, it is thought, drove most of these developments. This gradual evolution occurred over vast time spans well before 40 ka (40,000 years) ago, and some of it was already underway well before a million years ago (*contra* McBrearty and Brooks 2000 who attribute these changes to the Middle Stone Age of Africa). The evidence for the long-range model consists of a panoply of material finds which the short-range protagonists seem unfamiliar with. When confronted by individual finds challenging their model they try to explain them away; or regard them as a 'running ahead of time' (Vishnyatsky 1994); or pronounce them untypical; or challenge their dating or the scholarly competence of their presenters. This is a familiar pattern in Pleistocene archaeology, dating back to the times of Boucher de Perthes and Pengelly.

Irrespective of which model is right, we have to note that there is currently no consensus about which time frame we need to look at if we wish to consider when cognitive evolution occurred, or against what kind of cultural and technological background, or what course it might have taken. There are no intermediate possibilities, because the two models are incapable of accepting compromise and are mutually exclusive.

Here I present a review of the short-range model—its basis and underlying assumptions in the light of recent developments—with special attention to its most extreme form, the replacement hypothesis. Although an archaeological hypothesis, this model derives its remaining main support from genetics (though incorrectly dated human remains formed its basis originally). Its key assumption is that the ancestors of all extant humans conquered the world during the Late Pleistocene, being genetically, technologically, cognitively, culturally and intellectually superior to all of their contemporaries of the period preceding their Exodus from Africa. In the process they annihilated or out-competed all their contemporaries (ecologically or by introducing new diseases) in all parts of the world then settled. In the 'African Eve' version, all humans from about 27 ka BP onwards are descended from them exclusively. Because these 'anatomically modern' ancestors of ours were a separate species, unable to breed with other hominins, all extant human populations must originate from a small, isolated population in some unspecified region of sub-Saharan Africa.

The Genetics

This 'African Eve' or 'replacement' hypothesis does not resemble a realistic model of phylogenetic evolution or demographic population dynamics. The paradigm is not based

on an unrefuted proposition of scientific status, but on controversial contentions of *some* geneticists (opposed by others), and there is virtually no archaeological evidence in its favour. Even the genetic justification of this model is fundamentally flawed, for several reasons. Different research teams have produced different genetic distances in nuclear DNA, i.e. the distances created by allele frequencies that differ between populations (e.g. Vigilant et al. 1991; Barinaga 1992; Ayala 1996; Brookfield 1997). Some geneticists concede that the model rests on untested assumptions; others even oppose it (e.g. Barinaga 1992; Templeton 1996; Brookfield 1997). The various genetic hypotheses about the origins of 'Moderns' that have appeared over the past few decades place the hypothetical split between Moderns and other humans at times ranging from 17 to 889 ka BP. They all depend upon preferred models of human demography, for which no sound data at all are available. This applies to the contentions concerning mitochondrial DNA (African Eve) as much as to those citing Y-chromosomes (African Adam: Hammer 1995). The divergence times projected from the diversity found in nuclear DNA, mtDNA, and DNA on the non-recombining part of the Y chromosome differ so much that a time regression of any type is extremely problematic. Contamination of mtDNA with paternal DNA has been demonstrated (Gyllensten et al. 1991), and Kidd et al. (1996) have shown that, outside Africa, the elements of which haplotypes are composed largely remain linked in a limited set.

The genetic picture in Africa as well as elsewhere has been found to be far more complicated than the Eve proponents ever envisaged. The much-promoted claims that Neanderthals were genetically different from modern Europeans, based on very frag-mentary DNA sequences, were erroneous, as Gutierrez et al. (2002) have shown. Their analysis suggests that the pair-wise genetic distance distributions of the two human groups overlap more than claimed, if the high substitution rate variation observed in the mito-chondrial D-loop region and lack of an estimation of the parameters of the nucleotide substitution model are taken into account. Moreover, the results presented from museum specimens, especially 'Neanderthal' remains, are probably irrelevant. Pruvost et al. (2007) have recently shown that DNA deteriorates rapidly after excavation, up to 50 times as fast as in buried specimens. The various reported 'fragmentary DNA sequences' from 'Neanderthal' remains stored for up to 150 years need to be considered in that light. A large part, on average 85%, of the genetic material preserved in fossils is lost as a result of treatment by archaeologists and storage in museums, therefore the results disseminated from these specimens and their interpretations may be questioned. More reliable are genetic studies of living populations, which have shown both Europeans and Africans have retained significant alleles from multiple robust populations (Hardy et al. 2005; Garrigan et al. 2005; cf. Templeton 2005). In fact, the Neanderthal genome seems to include an excess of human-derived single nucleotide polymorphisms (Green et al. 2006).

Relethford (2002) has detected drastic spatiotemporal changes in the genetic profiles of three recent Chinese populations, negating the idea of regional genetic homogeneity. He found that the Linzi population of 2,500 years BP is genetically more similar to present-day Europeans than to present-day eastern Asians. This refutes the idea that regional com-parisons of DNA can establish affinity or its absence. Assumptions about a neutral mutation rate and a constant effective population size are completely unwarranted, and yet these variables determine the outcomes of all the genetic calculations. For instance, if the same divergence rate as one such model assumes (2–4% base substitutions per million years) is applied to the human-chimpanzee genetic distance, it yields a divergence point of 2.1–2.7 million years, which can be considered unambiguously false. Nei (1987) suggests a much slower rate, 0.71% per million years, according to which the human-chimpanzee separation would have occurred 6.6 million years ago, which is close to the estimate from

nuclear DNA hybridization data of 6.3 million years. It also appears to be close to what the fossil record seems to indicate. However, this would produce a divergence of 'Moderns' at 850 ka BP, over four times as long ago as the favoured models, and eight times as long ago as the earliest fossils of *purported* Moderns ever found (though both their dating and modernity are controversial). To explain away the perplexingly late split of the Moderns, some of the short-range geneticists have even resorted to suggesting mtDNA transfer between 'proto-humans' (e.g. australopithecines) and proto-chimpanzees (i.e. species presumably separated by millions of years of evolution), while at the same time excluding such a possibility for robust and modern populations (Hasegawa et al. 1985).

When the same 'genetic clock' used in all this is applied to dogs and suggests that the split between wolves and dogs occurred 135 ka ago, archaeologists reject it on the basis that there is no palaeontological evidence for dogs prior to about 14 ka BP. In other words, the weak theory that provides the *only* basis for the replacement scenario is rejected when applied to another species. The scenario of genetic isolation, long enough to render Eve's progeny unable to interbreed with any other humans, is another unsupportable short-range notion. Interbreeding yielding fertile offspring occurs between many species (e.g. in wolf, coyote and dog; in several species of deer; in mallards and ducks).

In combining the model of a population bottleneck with that of an endemic population we also need to remember that genetic bottlenecks tend to reduce fitness in the population (Bryant et al. 1986), rather than bring about the population's supremacy (cf. Hawks et al. 2000), so how did Eve's progeny attain their 'superior' qualities? Another genetic model (Pennisi 1999) has modern humans evolving from two discrete populations, one resulting in modern Africans, the other in non-Africans. Templeton (2002) contradicted the replacement hypothesis genetically. Using 10 different haplotype trees (MtDNA, Y-chromosomal DNA, two X-linked regions and six autosomal regions), he showed that following an initial exodus from Africa at about 1.7 million years ago, there were at least two subsequent major expansions out of Africa. One occurred at 840–420 ka ago, the second at 150–80 ka ago. The genetic data also show ubiquity of genetic interchange or interbreeding between human populations *throughout the 1.7 million years*.

It is also of concern that the first colonization dates assumed by the geneticists supporting the Eve model are mostly false (see Cann et al. 1987), and these researchers admitted from the beginning of their involvement that their base-pair substitution rates were based on the (almost certainly false) assumption of single colonization events. It has long been known in Australia, for instance, that there were multiple settlement events, and the same can be assumed in most other cases of colonization (Bednarik and Kuckenburg 1999). In Australia, the lineage of the earliest known 'anatomically modern' remains, Lake Mungo 3, has been shown to have probably diverged before the most recent common ancestor of contemporary human mitochondrial genomes (Adcock et al. 2001). In the absence of any reliability of the proposed rates of nucleotide changes and the many variables to be accounted for effectively, the contentions by the replacement advocates are unsupported, and nucleotide recombination renders their views redundant (Strauss 1999).

Instead of unambiguously showing that anatomically modern humans originate in one region, sub-Saharan Africa, all the available genetic data suggest that gene flow occurred in Old World hominins throughout much of recent human evolution (Templeton 1996, 2002), which is also strongly suggested by all available empirical evidence, both palaeoanthropological and archaeological. *Homo sapiens sapiens* seems to have evolved as a single extended breeding unit across much or most of the region then occupied by robust *sapiens* hominins, from southern Africa to eastern Asia and Australia. Extensive genetic drift,

introgression and episodic genetic isolation rather than mass migration probably account for the mosaic of hominin forms through time.

The Fossils

The African Eve model derived initially from the Afro-European *sapiens* model of G. Bräuer's work, which relied on the 'datings' of Professor Reiner Protsch 'von Zieten'. Following his forced resignation from the University of Frankfurt, it has become clear that all of Protsch's dates for German human remains were spectacularly false, and that the replacement advocates had been the subjects of a hoax for several decades. If they had not relied on the claimed ages of the German fossils, it is unlikely that the model would have been launched quite so enthusiastically, if at all. The recent rejection of the Upper Palaeolithic age of nearly all German human remains formerly attributed to that period has certainly great consequences for all versions of the African Moderns model.

Of particular interest is the Hahnöfersand calvarium, described as so robust that it was judged to show typical Neanderthal features (Bräuer 1980). It was initially dated to the earliest 'Upper Palaeolithic' (Fra-24: 36,300 ± 600 BP; UCLA-2363: 35,000 ± 2,000 BP, or 33,200 ± 2,990 BP; Bräuer 1980), results that conflict sharply with those now secured by Terberger and Street (2003): P-11493: 7,470 ± 100 BP; OxA-10306: 7,500 ± 55 BP. The re-dating of the skull fragment from Paderborn-Sande yielded even more dramatic differences. Originally dated at 27,400 ± 600 BP (Fra-15; Henke and Protsch 1978), Terberger and Street (2003) report an age of only 238 ± 39 BP (OxA-9879). Then there is the cranial fragment of Binshof near Speyer, dated by R. Protsch in the 1970s as Fra-40 to 21,300 ± 320 BP. According to Terberger and Street it is only 3,090 ± 45 carbon years old (OxA-9880). These authors also analyzed two individuals from the Urdhöhle near Döbritz, which had been attributed to the Upper Palaeolithic, and found them both to be about 8,400 years old. Only one German 'Upper Palaeolithic' specimen remains safely dated to earlier than 13,000 BP, the interred remains from Mittlere Klause in Bavaria. A carbon isotope date of 18,200 ± 200 BP (UCLA-1869) from a tibia fragment (Protsch and Glowatzki 1974) has been confirmed by Terberger and Street's date from a vertebra, of 18,590 ± 260 BP (OxA-9856). It has therefore become clear that there are currently no 'modern' remains from the first half, if not the first two thirds of the west-central European Upper Palaeolithic. Nearly all the dates for German humans from the radiocarbon laboratory of the University of Frankfurt am Main appear to be in error by significant margins, and a similar problem may have affected some from the University of California, Los Angeles. Another German key specimen, the skull from Kelsterbach, has mysteriously disappeared from the safe of the Frankfurt institution. It had been dated to 31,200 ± 1,600 (Fra-5) (Protsch and Semmel 1978; Henke and Rothe 1994), but is now also believed to be of the Holocene, perhaps the Metal Ages (Terberger and Street 2003).

The replacement model has also heavily depended on the anatomically modern Vogelherd specimens to believe that the people of the Aurignacian, the first Upper Palaeolithic 'culture', were in fact 'Moderns'. This was particularly precipitate, because anyone who has actually examined the Vogelherd skull (Stetten I: from Vogelherd cave, near Stetten in the Swabian Jura, southwestern Germany) will have been struck by its modern appearance, both anatomically and in terms of its preservation. More careful commentators have long warned that 'judging by its appearance it would fit much better into a late phase of the Neolithic' (Czarnetzki 1983, p. 231). Gieseler (1974) had expressed similar concerns about Stetten II, a cranial fragment, and others also favoured an

attribution to the site's Neolithic occupation. The placement of the Vogelherd individuals in the Aurignacoid deposits always seemed incongruous, and yet Stetten I has long been one of the replacement camp's key exhibits. Its putative age of 32 ka now stands refuted by its direct dating to the late Neolithic period (Conard et al. 2004), confirming the obvious: that it is part of an intrusive burial. Direct carbon isotope determinations, of samples taken from the mandible of Stetten 1, the cranium of Stetten 2, a humerus of Stetten 3 and a vertebra of Stetten 4, all agree, falling between $3,980 \pm 35$ BP and $4,995 \pm 35$ BP. Contrary to Churchill and Smith (2000), Bräuer (1989: 136) and numerous others, the Stetten specimens tell us therefore absolutely nothing about the skeletal anatomy of the 'Aurignacians'.

Similarly, the sample from Cro-Magnon in France, traditionally regarded as typical representatives of invading 'Moderns' in Europe, has been falsely attributed. Sonneville-Bordes (1959) placed the four adults and four juveniles in the late Aurignacian, Movius (1969) suggested an age of about 30 ka BP and preferred an attribution to the Aurignacian 2. The recent re-dating to about 27,760 carbon years BP renders both opinions invalid, and the remains are of the Gravettian, i.e. the 'culture' that followed the Aurignacian (Henry-Gambier 2002). Moreover, the frequent reference to the Cro-Magnon remains as the 'type fossil' of early 'modern' anatomy in Europe requires qualification. Wolpoff has long pointed out that the very pronounced supraorbital torus, projecting occipital bone and other features of cranium 3 are Neanderthaloid rather than gracile. This—along with other aspects of the generally robust Cro-Magnon series—casts doubt on the full modernity of this group, and, besides, tells us nothing about the anatomy of the 'Aurignacians'.

Similarly tenuous are the identical claims for the Mladeč specimens from the Czech Republic. It is uncertain that the cave was even accessible to Upper Palaeolithic humans; it is thought that their remains entered the cave via a vertical shaft from above (Bednarik 2006). The site was entirely bereft of archaeological strata by the time systematic excavations were developed, and little is known about its archaeology (Jelínek 1987). Recent attempts to provide direct dates from some of the human remains (Wild et al. 2005) yielded five results ranging from about 26,330 to 31,500 BP. The fossils are therefore at best from the latest part of the Aurignacian period (45–30 ka BP), but also point to a possible Gravettian age. Moreover, there is considerable evidence that the Mladeč humans were far from fully modern (Smith 1982, 1985; Frayer 1986; Trinkaus and Le May 1982; and especially Jelínek et al. 2005). There appears to be pronounced sexual dimorphism, with male crania being very robust. The female specimens show similarities with, as well as differences from, accepted Neanderthal females. The Mladeč population thus seems to occupy an intermediate position between late *Homo sapiens neanderthalensis* and *H. sapiens sapiens*, a position it shares with numerous human remains from other Czech sites. The material from the Pavlov Hills is among the most robust available from the European Upper Palaeolithic, sharing its age of between 26 and 27 ka with yet another Moravian site of the Gravettian, Předmostí. The more gracile finds from Dolní Věstonice are around 25 ka old and still feature some archaic characteristics (particularly the Neanderthaloid specimen DV16). Morphologically similar specimens also come from Cioclovina (Romania), Bacho Kiro levels 6/7 (Bulgaria) and Miesslingtal (Austria), so this is unlikely to be a local phenomenon.

Other specimens that have been considered as very early European Moderns include the calotte from Podbaba, near Prague, variously described as sapienoid and Neanderthaloid, but undated; it probably belongs to the Mladeč-Předmostí-Pavlov-Dolní Věstonice spectrum. Then there are the robust but 'modern' hominin remains of the EUP ('early Upper Palaeolithic') at Velika Pećina, Croatia, close to the Neanderthal site Vindija. This

specimen, too, has been a principal support for the replacement advocates, but it too has joined the long list of European humans whose age was grossly overestimated. It is now considered to be only 5,045 ± 40 radiocarbon years old (OxA-8294; Smith et al. 1999).

The currently earliest 'intermediate' finds in Europe are the Peştera cu Oase mandible from southwestern Romania (Trinkaus et al. 2003), perhaps about 35,000 radiocarbon years old, and the partial cranium recently found in another part of the same cave (Rougier et al. 2007). Both are without an archaeological context. Although in some aspects 'modern', their 'derived Neanderthal features' identify them as post-Neanderthals rather than gracile 'Moderns'. Similarly, the finds from another Romanian cave, Peştera Muierii, about 30,000 carbon years old, are also clearly intermediate (Soficaru et al. 2006). The loss of the only relevant Spanish remains, from El Castillo and apparently of the very early Aurignacian, renders it impossible to determine their anatomy. French contenders for EUP age present a mosaic of unreliable provenience or uncertain age, and direct dating is mostly not available. Like the Vogelherd and other specimens, those from Roche-Courbon (Geay 1957) and Combe-Capelle (originally thought to be of the Châtelperronian levels; Klaatsch and Hauser 1910) are thought to be of Holocene burials (Perpère 1971; Asmus 1964), and the former is now apparently lost. Similar considerations apply to the partial skeleton from Les Cottes, whose stratigraphical position could not be ascertained (Perpère 1973). Finds from La Quina, La Chaise de Vouthon and Les Roches are too fragmentary to provide diagnostic details. The *os frontale* and fragmentary right maxilla with four teeth from La Crouzade, the mandible fragment from Isturitz and the two juvenile mandibles from Les Rois range from robust to very robust. Just as the Cro-Magnon human remains now appear to be Gravettian rather than Aurignacian, so do those from La Rochette. The Fontéchevade parietal bone does lack prominent tori but the site's juvenile mandibular fragment is robust.

This pattern of features intermediate between what palaeoanthropologists regard as Robusts (including 'Neanderthals') and Moderns is found in literally hundreds of specimens apparently in the order of 45–25 ka old (including the large Czech collection lost in the Mikulov Castle fire at the end of World War II). In Europe, their relatively recent age (ranging from 35 ka onwards) renders it useful to refer to them as post-Neanderthals. But intermediate forms between robust *Homo sapiens* and *Homo sapiens sapiens* existed also in Asia and Australia. They include examples, some of them much older, from right across the breadth of Eurasia, such as those from Abrigo do Lagar Velho, Crete, Starosele, Rozhok, Akhshtyr, Romankovo, Samara, Sungir, Podkumok, Khvalynsk, Skhodnya, as well as Chinese remains such as those from Jinniushan. This presents an overall picture that is very different from that which the replacement protagonists prefer. Their model cannot tolerate such intermediate forms, nor can it allow hybrids (at least not in its most extreme form), yet in Europe there is a clear continuation of some Neanderthaloid features right up to and into the Holocene. This is demonstrated not only by the Hahnöfersand specimen, but also by others, such as the equally robust Mesolithic skull fragment from Drigge, also from northern Germany, which is about 6,250 years old (Terberger 1998), and numerous other late specimens previously thought to be of the EUP. They range in age from the Magdalenian through to the Neolithic, and younger. The process of gracilization has in fact continued to the present time: even early Mesolithic material is about 10% more robust than modern Europeans. Indeed, Hawks (1997) has estimated that at least 25% of the ancestors of later Upper Palaeolithic people would need to be Neanderthals to account for the preservation of Neanderthal 'autapomorphies' observed (see also Frayer 1993, 1998; Frayer et al. 1994).

The second issue emerging from this brief review is that there are now almost no supposedly modern specimens left as possible contenders for attribution to EUP or

Aurignacoid industries. The maxilla from Kent's Cavern, United Kingdom ($\sim$31 ^{14}C ka BP), and the Romanian remains from Peştera Cioclovina ($\sim$29 ^{14}C ka BP) lack secure and diagnostic archaeological association. There are, however, numerous Neanderthal remains to fill this void. Of particular interest are the most recent, those from Saint Césaire ($\sim$36 ka), Arcy-sur-Cure ($\sim$34 ka), Trou de l'Abîme (Aurignacian), Máriaremete Upper Cave ($\sim$38 ka), Sungir and Vindija Cave ($\sim$28 and $\sim$29 ka). At the first site, the Neanderthal remains of a burial occur together with clear Châtelperronian artefacts, which until 1979 had been generally assumed to be the work of anatomically modern humans. Arcy-sur-Cure, also in France, yielded numerous ornaments and portable art objects, again from a Châtelperronian. This prompted various convoluted explanations of how these pendants could have possibly found their way into a 'Neanderthal' assemblage (e.g. White 1993; Hublin et al. 1996). Trou de l'Abîme near Couvin in southern Belgium yielded Neanderthal remains together with a typical Aurignacian industry, and three 'Neanderthal' teeth from the Máriaremete Upper Cave in Hungary are of the Jankovichian (Gábori-Csánk 1993). The Streletsian of Sungir in Russia has yielded a Neanderthaloid tibia from a triple grave of Graciles (Bader 1978). The relatively gracile Neanderthals from Vindija, the most recent found so far, are considered transitional (Smith and Raynard 1980; Wolpoff et al. 1981; Frayer et al. 1993; Wolpoff 1999; Smith et al. 2005) and used EUP tools and technology. Vindija Vi-207 is a mandible of 29,080 $\pm$ 400 carbon years BP (OxA-8296), Vindija Vi-208 is a parietal of 28,020 $\pm$ 360 carbon years BP (OxA-8295) (Smith et al. 1999). These 'late Neanderthals' exhibit significant reduction in Neanderthaloid features, such as mid-facial prognathism and supraorbital tori. The related stone tools are of EUP typology, and Ahern et al. (2004) report the occurrence of apparent bone fabricators.

In short, the deposits of EUP traditions in Europe have not yielded any 'anatomically modern' human remains so far, but they have produced 'Neanderthal' remains at least at six sites. Moreover, numerous other specimens are intermediate, combining gracile and robust features, and some of the latter continue for much of the last 30 ka. As in the rest of the world then occupied by humans, the change from robust to gracile was gradual, taking some tens of millennia. No sudden replacement occurred at any point in time, anywhere.

The Cultures

The record so far mentioned already suffices to significantly discredit the replacement hypothesis, and with it much of the 'short range' model, but there is much more still to consider. The record of technologies straddling the contrived division between Middle and Upper Palaeolithic technocomplexes is perhaps even more persuasive. Across Europe, from Spain to Russia, the evolution of the EUP traditions from the preceding Mousterian and Micoquian technocomplexes is evident at literally hundreds of sites. Since the times of Lothar Zotz, it has been widely purported that the 'invading Moderns'(the first in history to be 'bringing beads to the natives') entered Europe from the southeast, perhaps through a 'Danube corridor' or through the Balkans. However, there is no archaeological indication of any EUP technology spreading from the southeast to western Europe—or, for that matter, from the Levant or anywhere else, supporting the replacement model. Even the Ahmarian is thought to have developed gradually and in situ, from 'Middle Palaeolithic' traditions (Bar-Yosef and Kuhn 1999).

The earliest appearance of EUP industries occurs fairly simultaneously between 45 and 40 ka BP, or slightly earlier, across much of central (Senftenberg), southern and eastern Europe (and in Siberia, e.g. Makarovo 4/6 and Kara Bom; and perhaps in Iran and

elsewhere in Asia). The Aurignacian of El Castillo level 18, in Spain, seems to commence well before 40,000 years ago (Cabrera Valdés and Bischoff 1989; carbon dates of 40,000 ± 2,100, 38,500 ± 1,800, 37,700 ± 1,800 BP), but unfortunately the human remains from the deposit have been lost. The tool industry shows distinctive typological continuities from the underlying typical Mousterian in layer 20 (Cabrera Valdés and Bernaldo de Quirós 1985). Diagnostic Aurignacian types such as carinated and nosed scrapers occur in the Mousterian levels, not only at El Castillo but also at El Pendo and Cueva Morín. The change from the 'Middle Palaeolithic' to the EUP is marked here primarily by a progressive increase in the number of burins and end scrapers, at the expense of side scrapers. At Abric Romani, the lowest AMS dates from the Aurignacian average 37 ka BP, but the probably more relevant uranium series dates point to a sidereal age of 43 ka BP (Bischoff et al. 1994). This distortion (see below) suggests therefore that the earliest Aurignacian in northern Spain should be up to 45 ka old. On the other hand, in Caldeirao Cave, Portugal, the change from the Mousterian to the basal EUP occurs only at about 27.6 ka BP, shortly after the Aurignacian appears in the far south of Spain (e.g. at Gorham's Gave, Gibraltar, at 28 ka BP). At El Pendo, the Lower Périgordian (i.e. Châtelperronian) industry, which in France has been attributed to Neanderthals, overlies two Early Aurignacian levels, a stratigraphic pattern also observed in France, e.g. at Roc de Combe (Bordes and Labrot 1967) and La Piage (Champagne and Espitalié 1981). The El Pendo Châtelperronian from level VII has yielded a series of bone points and perforated objects (González Echegaray et al. 1980). The latter were almost certainly used as pendants, such as those found at Arcy-sur-Cure. The Châtelperronian at Morín Cave has been dated to about 36,950 BP, an antiquity similar to that of the same tradition at French sites (37–33 ka BP). The most recent 'Middle Palaeolithic' occupation known in Spain, however, is at Abric Agut. According to both radiocarbon and U-series dating, it occurred 13–8 ka BP, that is, at the Pleistocene-Holocene interface (Vaquero et al. 2002).

The Iberian pattern of a mosaic of regional EUP lithic industries continues further east along the Mediterranean. In southern Italy, several Aurignacoid variants have been reported, such as the Uluzzian (Palma di Cesnola 1989), the Uluzzo-Aurignacian and the Proto-Aurignacian (43–33 ka BP). Here, as much as 30% of lithic assemblages are comprised of blades and prismatic cores (Kuhn and Bietti 2000; Kuhn and Stiner 2001). The pattern of a gradually decreasing component of Middle Palaeolithic technology evident in Spain is found here also, particularly in the three stages of the Uluzzian (Palma Di Cesnola 1976). In the Alpine region, the final Mousterian grades seamlessly into the Olschewian, another Aurignacoid tradition (45–35 ka BP). Further east this mosaic includes the Bachokirian of the Pontic region (>43 ka BP), the Bohunician of east-central Europe (Svoboda 1990, 1993; Tostevin and Škrdla 2006; 44–38 ka BP), and the Spitsyn culture of Russia (>40 ka). The latter, presumably a Neanderthal tradition, is fully Upper Palaeolithic. It has yielded a substantial series of superbly made beads and pendants at Kostenki 17 from below the Campanian Ignimbrite sediment, made from stone, snail shells, fox canines and silicified and semi-translucent fossils (Bednarik 2008, Fig. 4). Certainly being more than 40 ka old, these palaeoart objects are also probably the work of Neanderthaloid people, they have long been known, yet the Arcy-sur-Cure ornaments have since 1979 been falsely considered unique. Similarly, cupules occur on the sepulchral block from La Ferrassie, indisputably made by Neanderthals, yet the same phenomenon is common in the subsequent Aurignacian, from such sites as Le Cellier, Castanet and Abri Blanchard (Delluc and Delluc 1978; Peyrony 1918, 1934).

It is clear that a succession of traditions connect Middle Palaeolithic biface techno-complexes, including the late Eastern Micoquian, with typical late Palaeolithic ones,

through the Szeletian of eastern Europe (Allsworth-Jones 1986; 43–35 ka BP), the Jankovician of Hungary with its osteal artefacts, the Streletsian with its still numerous leaf-points, and those of the north European Altmühlian (c. 38 ka BP), Lincombian (38 ka BP) and Jerzmanovician (38–36 ka BP). These and other 'intermediate' industries, such as those of Anatolia, all indicate that a separation between Middle and Upper Palaeolithic tech-nocomplexes is not reflected in the technologies of the period from perhaps 45 to 30 ka. Indeed, a degree of regionalization precedes this period even in the late Mousterian (Kozłowski 1990; Stiner 1994; Kuhn 1995; Gamble 1999; Riel-Salvatore and Clark 2001). That period is marked by both miniaturization and increasing use of blades, by improved hafting and the use of backed or blunted back retouch, apparently heralding subsequent developments. Therefore it is useful to challenge the concept of an EUP: there is no clear-cut separation from the late 'Middle Palaeolithic' industries, and this artificial dichotomy has only served to emphasize changes in technology that were gradual rather than sudden (Fedele et al. 2003). Instead of denoting these numerous intermediate tool traditions as early Upper Palaeolithic, they could just as credibly be defined as late Middle Palaeolithic. Indeed, there are almost no parts (as distinct from individual sites) of Europe where a clear separation of Middle and Upper Palaeolithic stone tool sequences can be observed.

Looking further afield, these two definitions have even less currency. In parts of Africa, Upper Palaeolithic technologies occur tens of thousands of years before their advent in Europe: the microlithic features of the Howieson's Poort phase, the prismatic blades of the Amudian, and the bone harpoons from Katanda come to mind (Brooks et al. 1995). In India, the Upper Palaeolithic is notoriously hard to pinpoint (Bednarik et al. 2005), while China lacks a distinctive Middle Palaeolithic (Xing Gao and Norton 2002). In Australia, the Middle Palaeolithic mode of production (Foley and Lahr 1997) continues until well into the Holocene (and in Tasmania to European contact), while the Middle Stone Age of sub-Saharan Africa continues until 20 ka ago. On the Indonesian island of Flores, a putative separate hominin species supposedly derived from *Homo erectus* or even older stock used 'Upper Palaeolithic' tool types, while one of the two different Acheulian hominins at Narmada (Kennedy et al. 1991; Sankhyan 1997) has a brain capacity well above that of Moderns.

Nothing seems quite as well ordered in hominin evolution as our neat theories predict it should be. Some of the most challenging evidence comes from Australia. Here, first colonization is universally agreed to have been by modern humans, though with distinct archaic features. The replacement advocates have no choice but to argue that the sym-bolism revolution they place at the beginning of the Upper Palaeolithic must have occurred before this colonization event, perhaps 60–40 ka ago. But the technology of the Australids is certainly Middle Palaeolithic, and often even Lower Palaeolithic, and continues to be so until mid-Holocene times (Brumm and Moore 2005). Once again, the replacement scenario is clearly refuted on the basis of the definitions of its own advocates.

Discussion

The overwhelming impression of the collective evidence from the artefact assemblages of Europe, from the time interval of about 45–25 ka ago, is that there is no evidence of any sudden change of technology as one would expect to find had there been an intrusion of genetically different people with a more developed material culture. Instead, there is a complex mosaic of regional traditions that, in general, exhibit a gradual change of several variables, such as tool size, knapping method, retouch and reuse. In numerous cases, in the

continent's east, south and southwest, the gradual evolution of so-called Upper Palaeolithic traditions from Middle Palaeolithic ones can be traced at individual sites. This alone negates any ideas of a mass movement of people to account for changes. Moreover, the notion that different ethnic groups such as robust *sapiens* people (e.g. 'Neanderthals') and gracile *sapiens* people ('Moderns') used different technocomplexes is perhaps one of the greatest fallacies of the replacement proponents. Several 'Upper Palaeolithic' 'cultures' are the work of 'Neanderthals', just as 'Moderns' used a Middle Palaeolithic mode of production, for instance in the Maghreb, Levant, in Spain, Ukraine and Australia. Wherever robust and more gracile forms of humans apparently co-existed, they appear to have shared similar cultures, technologies, even ornaments. Therefore, the idea that one can trace ethnic differences through tool assemblages is unlikely to be helpful. The Aurignacian did not arrive from the Levant—on current evidence it would seem to commence in Catalonia and Cantabria—and other EUP traditions seem to emerge about the same time in various eastern European centres, such as the Russian Plain, and in Asia.

Similarly, the use of unproven taxonomic technological divides, especially that between Middle and Upper Palaeolithic, as reified tools of analysis and definition is as unfortunate as the use of minor skeletal differences, such as those between robust and gracile humans, in inventing movements of populations. Not only is there no evidence of any major population replacing another in Europe during the period in question, this is again an exercise in trying to make the evidence fit the theory. All of this has long been known and, to some extent, appreciated, but now there is a new possibility: that the Aurignacians, and indeed all people with EUP traditions, were not 'Moderns', but 'Neanderthals'.

In the final analysis the replacement advocates placed all their trust on the unassailability of the concept that the Aurignacian derives from their Moderns. They have for decades belaboured the cognitive sophistication evidenced by palaeoart and beads that could not possibly have anything to do with Neanderthals. If all this wonderful art were the work of Neanderthal descendents, the replacement model would be defeated on all counts: technology, culture, genetics and physical anthropology. So even if the retreating argument were to be now, perhaps the Aurignacians started out as a Neanderthaloid society, but by the time of Chauvet and Vogelherd (32 ka) their culture had become adopted by Moderns, that would still negate the integrity of the replacement model. If this 'culture' had been begun by Neanderthals, and then, half-way through, taken over by 'culturally superior invading Moderns', why should we assume the latter's 'superiority'? And at what specific point in time did the replacement occur?

The replacement proponents have hailed each of the very late dates for Neanderthal remains as they appeared in recent years as a confirmation of their prediction that the evidence 'effectively precludes any hypothesis of a gradual evolution from Neanderthal to anatomically modern populations within Western Europe itself' (Mellars and Stringer 1989, p. 8). They had strongly contended that 'a whole spectrum of radical cultural innovations' (Mellars and Stringer 1989, p. 8) appeared with the beginning of the Aurignacian, and that the 'symbolic explosion model for the Middle–Upper Palaeolithic transition, criticized by Bednarik, has the merit of emphasizing the entirely modern character of the Aurignacian behaviour' (d'Errico 1995, p. 618). According to them, the people of the Aurignacian are 'indistinguishable' from us in terms of cognition, behaviour and cultural potential. Perhaps this is so, but what the evidence now shows is that the period from 45 to 28 ka BP has yielded dozens of Neanderthal remains in Europe, but no securely dated, unambiguous anatomically modern human remains. This point is reinforced by the occurrence of undisputed Neanderthal finds together with EUP lithic traditions at several sites, but no Moderns have so far been found in clear association with Aurignacian

or any other EUP artefacts. Therefore the proposition that the Aurignacian and other Aurignacoid or EUP industries are traditions of Neanderthals or of their descendants is supported by evidence, the proposition that it is the culture of invading 'Moderns' is not. Hence we are left with the dictum coined by the African Eve advocates themselves: *that the EUP people (i.e. late or post-Neanderthals) were of 'entirely modern behaviour'*.

The 'short-range' advocates have apparently failed to grasp the effects of the new data on their hypothesis (e.g. Mellars 2005). There are only three realistic alternatives to account for the EUP tool, rock art and portable art traditions: that they are the work of Neanderthals, or of the descendents of Neanderthals, or of invading Moderns. There is currently no evidence for the third possibility, and the two others are unacceptable to the African Eve advocates because they would refute their hypothesis. Certainly, the onus is presently on these scholars to present evidence that there were anatomically fully modern humans, free of any 'Neanderthaloid' features, in Europe during the entire first half of their 'Upper Palaeolithic', i.e. since 45 ka BP. Until they do this, their contentions about human evolution over this period in the European theatre are contradicted by the available skeletal evidence.

The Upper Palaeolithic art traditions are a local development in central and south-western and northeastern Europe, they were not introduced from Africa or anywhere else, there are no precedents for the prominently zoomorphic traditions of western Europe. They were initiated by Neanderthals and developed by post-Neanderthals. In most of the world then occupied by humans, art traditions are almost entirely non-iconic in nature—the iconic content of the UP art in western Europe is an aberration not found elsewhere, with over 99% of the world's Pleistocene palaeoart being non-figurative (Bednarik 1993; Sreenathan et al. 2008). There is not one iota of archaeological evidence of a movement of Late Stone Age traditions northwards through northern Africa, in fact the Middle Stone Age continues to about 20 ka in that region. Moreover, we must always remember that we know absolutely nothing about one half of the human Pleistocene population, in Europe or anywhere else. The people who lived on coasts, in deltas or along the lower reaches of major rivers were no doubt more sedentary, had much more reliable food sources, and they would have made up around half the human population. Because of the substantial fluctuations of the sea level throughout the Pleistocene, most traces of them are beyond our reach or have been destroyed. Indeed, the only Pleistocene populations of shores we can know about are those that lived along large lakes that have long ceased to exist. We know of such sites, and what we find at them is that the people of the Lower Palaeolithic period already built villages of stone-walled shelters (Ziegert 2007). This renders the minimalist explanations of much Pleistocene archaeology inadequate. Not only is our knowledge of the mobile inland hunters limited and skewed by various taphonomic factors, we know nothing about the genetic, cultural and technological status of the—no doubt more developed—coastal tribes, and what they contributed to cultural and physical evolution.

The most probable explanation for many changes in Europe *during* the EUP is that the Campanian Ignimbrite (CI) event in southern Italy (Barberi et al. 1978; Fedele et al. 2002) and the immediately subsequent Heinrich 4 Event prompted major demographic adjustments. The CI volcanic eruption, which according to the best data available occurred $39,280 \pm 110$ or 40,012 years BP (Fedele and Giaccio 2007), was the greatest catastrophe in Europe's Late Pleistocene and the attendant stresses or interactions among human groups would have facilitated rapid adaptation. That very same mechanism could plausibly affect genetics and human morphology in much the same way. It is well-known genetically that introgressive hybridization (Anderson 1949) between populations tends to increase at times of ecological stress. Previously deleterious variants, be they mutation- or

introgression-derived, may become adaptive. Moreover, a sharp reduction in gene pool size is the most effective factor in the acceleration of phylogenetic change in a population, particularly if it is combined with genetic drift or introgression across contiguous populations subjected to demographic adjustments. Certainly, there is no evidence that, in Europe, the humans concerned were anything other than very late Neanderthals; there is no indication of the presence of 'more modern' types at 40–35 ka BP. Nor are the pre- and post-IC event artefact assemblages sufficiently different to allow us to postulate any involvement of intrusive populations. It is then unnecessary to resort to mass migration and replacement from Africa. It needs to be taken into consideration that the many archaic or robust *sapiens* populations of the Old World existed in various climatic and ecological environments, therefore would have had a much higher number of adaptive mutations, and would have genetically overwhelmed a numerically smaller intrusive population bringing with it a much smaller number of adaptive alleles. Ultimately, demographic genetics, that is, allele drift based on generational mating site distance, easily accounts for archaeologically observed population changes (Harpending et al. 1998). A distance of merely 50 km per generation is most reasonable for such highly mobile populations, and suffices to explain the travel of genes over 10,000 km in as few as 200 generations. Yet the enormous time scale available for the development of 'Moderns' amounts to perhaps 2,000 generations.

But there is a more parsimonious explanation available for this universal change from robust to gracile humans. If we add to the equation the effect when breeding mate selection becomes increasingly moderated by cultural factors (such as cultural constructs of attractiveness, along with perhaps social position, communication ability, adornment), we have a far more plausible explanation for the worldwide change from robust to gracile types from roughly 40 ka to the present, than the weakly supported replacement hypothesis offers. This is certainly not a development unique to Europe, it is found in Australia, Asia and Africa as well—a key factor that has remained largely ignored. There is no natural evolutionary explanation for this *universal* change, it did not involve any increase in brain size or other improvement in evolutionary fitness. In fact, Neanderthals had larger brains than their descendants, modern Europeans. Nor does the cranial gracility of modern humans confer any evolutionary benefit on them, and yet physical anthropologists have uniformly failed to ask the obvious: why did *Homo sapiens* change to gracile skull architecture and other inferior skeletal and muscular features? In the case of both australopithecines and humans, evolution typically selected in favour of robustness, yet in the second half of the Late Pleistocene, this trend was reversed and neotenous features were strongly selected. It is incumbent upon us to explain why a species should suddenly, in evolutionary terms, develop such regressive features as thinner skulls, significantly reduced bone and muscle strength, and perhaps even hair loss in a cold region. Many other aspects of the marked foetalization in recent hominins need to be explained. Numerous features of humans are shared by foetal or infantile apes: the *labia majora* and hymen, the absence of a penis bone, the forward-pointing organs of the lower abdomen, lack of hair except on chin and top of head, thin-walled globular skull, absent tori, or the shapes of forehead, hands and feet, to name only some. Nature does not select for such plainly disadvantageous variables, but culture might.

This is where Darwin needs to make room for Mendel. The most logical explanation is that cultural factors had begun to dominate breeding patterns to the extent that modern humans are the outcome of their own, albeit unintended, domestication. The dog, domesticated to even more radical skeletal extremes in just 14 ka, provides a dramatic example of the effects of domestication, but so do numerous other species. Cattle, pigs,

cats and so on all experienced reticulate evolution through massive introgression, and I propose that humans were no different. We would be hard pressed to deny that cultural determinants had become so powerful in recent human phylogeny that they could have selected in favour of gracility. The most parsimonious theory to account for the apparent reduction in evolutionary fitness is that physical appearance became a cultural construct affecting mate choice, beginning with a sexual preference for females with neotenous characteristics. In Europe, it is clear that in the post-Neanderthal populations, gracility began as a female feature; the decline of robusticity in males lagged many millennia behind the gracilization of females—as it still does today. Ethologically, sexual dimorphism is usually related to such behaviour as fighting between males, but its rapid and universal disappearance towards the Final Pleistocene suggests not a selection in favour of not fighting, but rather a non-natural factor—a cultural factor: constructs of attractiveness affected mating patterns. Individuals considered attractive had more offspring, and it is they who 'replaced' those with robust genes.

Irrespective of whether this new theory of human 'self-domestication' finds as little favour as the claim by Boucher de Perthes that humans and Diluvian fauna coexisted, the hypothesis that replacement in Europe of Robusts by Graciles was not the result of migration is a great deal harder to reject. And, after all, the numerous human footprints I observed in Chauvet Cave, next to the most exquisite rock art I have ever seen, were apparently made by Neanderthals (Bednarik 2005). But who knows, perhaps they only came to admire the work of their cultural betters, their incredibly gifted, mythical cousins from Africa.

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