ZILHÃO, J. - *The Ebro frontier: a model for the late extinction of Iberian Neanderthals*, in STRINGER, C.; BARTON, R.N.E.; FINLAYSON, C. (eds.) - «Neanderthals on the edge: 150th anniversary conference of the Forbes' Quarry discovery, Gibraltar», Oxford, Oxbow Books, 2000, p. 111-121.

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The Ebro Frontier: A Model for the Late Extinction of Iberian Neanderthals

João Zilhão

Introduction

The idea that Mousterian industries and, consequently, Neanderthals, survived in Valencia and Andalucia until *c.* 28–30 ka, i.e., significantly later than elsewhere in Western Europe, was first put forward on a sound geoarchaeological basis by Vega (1990) and Villaverde and Fumanal (1990). Confirmation of the concept would soon come from reliable radiometric dates for several Portuguese cave and open air sites (Zilhão 1993; Raposo 1995) and for the Andalucian cave site of Zafarraya (Hublin *et al.* 1995). Meanwhile, however, much earlier results had also been obtained for Aurignacian contexts in Cantabria and northern Catalonya (Bischoff *et al.* 1989, 1994; Cabrera and Bischoff 1989; Maroto 1994; Cabrera *et al.* 1996), suggesting that the establishment of Upper Palaeolithic modern humans in those regions dated to *c.* 38–40 ka.

These facts inspired the formulation of the Ebro frontier model (Figure 12.1), first presented in October 1991, in the Madrid Conference on the origins of anatomically modern humans (Zilhão 1993). From the spatial and temporal aspects of the Iberian situation the proposition was derived that, in Western Europe, the replacement of Neanderthals by moderns had not been the outcome of a gradual geographic progression of the latter but a punctuated process during which stable biocultural frontiers might have lasted for significant amounts of time. One such frontier, largely corresponding to a major biogeographical divide (*cf.* Gamble 1986), would have been located along the Cantabro-Pyrenean mountains: for possibly as long as 10,000 years but certainly for at least some 5,000 years, the Ebro basin would have separated the Mousterian Neanderthals of Iberia from the Aurignacian Moderns of Cantabria, Aquitaine and northern Catalonya (Zilhão 1993, 1995, 1997, 1998, in press).

This hypothesis has since received considerable support from many different lines of evidence. This paper will discuss the archaeological data substantiating the model, focusing on the Portuguese material, and elaborate on its implications for the study of Neanderthal extinction.

The late Mousterian and the Aurignacian of Portugal

Table 12.1 shows an annotated list of all radiometric dates currently available for the Portuguese Middle Palaeolithic. Several sites have results later than 40 ka that cannot be accepted. In most cases, rejection is a consequence of technical problems in the dating procedures. Low collagen or low uranium content, for instance, immediately force us to remove from further consideration all the post-28 ka dates, which are in any case incompatible with the cultural stratigraphy of the Last Glacial (Zilhão 1995, 1997).

The inadequate nature of the dated material also brings into question acceptance of the radiocarbon results for Columbeira (Delibrias *et al.* 1986). The need to reject these results is also suggested by the stratigraphic context. According to Raposo and Cardoso (1998a), the sequence begins with a 0.5 m package rich in archaeological remains: levels 7–9. These are overlain by 1.5 m of deposits which, although poor in artefacts, are still entirely Middle Palaeolithic: levels 4–6. Accepting the radiocarbon age of *c.* 26 ka for level 7 necessarily entails, therefore, accepting that the Mousterian industries in levels 4–6 would have been contemporary with the later Upper Palaeolithic of the rest of Europe. Zbyszewski *et al.* (1977) argued along those lines on the basis of their analysis of foliates recovered at the site of Arneiro. Their hypothesis of a direct transition from the Mousterian to the Solutrean in Portugal is, however, empirically untenable. Not only are Aurignacian and Gravettian sites well described and dated in the region but the Arneiro

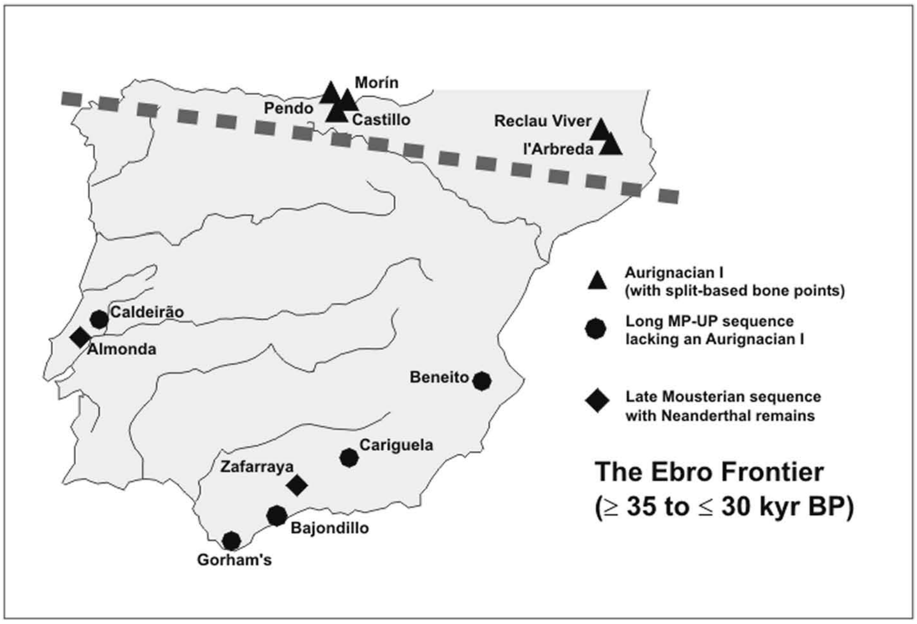

Figure 12.1: The Ebro frontier. For at least 5 ka a stable biocultural frontier separated Aurignacian modern humans living in Cantabria and northern Catalonya from the Mousterian Neanderthals that continued to thrive in the rest of Iberia until c. 20–30 ka.

foliates are neither Mousterian nor Solutrean points but Neolithic-Chalcolithic preforms for bifacial knives and halberds (Zilhão 1995, 1997).

Figure 12.2 gives the location of those sites for which the recent dates obtained are technically acceptable and compatible with regional chrono-stratigraphic patterns. From north to south, these are the open air site of Foz do Enxarrique (Ródão), and the cave sites of Furos and Caldeirão (Tomar), Almonda (Torres Novas), Pedreira de Salemas (Loures) and Figueira Brava (Setúbal). Furos and Pedreira de Salemas, however, yielded very small assemblages, and some of the other sites are not without problems either.

At Figueira Brava, the chaotic nature of the excavated deposit suggests that it may in fact correspond to a redeposition of material eroded from an inner chamber. Given that only Middle Palaeolithic artefacts are present (Cardoso and Raposo 1995), it is clear that the dated *Patella* shells must have been accumulated by Middle Palaeolithic humans. Consequently, the inference that Mousterian technologies survived in the region until *c.* 31 ka is legitimate. To what extent the lithic and mammal assemblages recovered in level 2 are entirely contemporary with the dated shells, or represent instead the mixed product of many different occupations taking place throughout a much longer time span, remains, however, to be seen. It is not certain, therefore, whether the upper left second premolar considered to show Neanderthal affinities by Antunes (1990–91) is indeed as recent as the occupation episode documented by the *Patella* shells (the two other bones attributed to *Homo* by Antunes – a phalanx and a metacarpal – clearly belong to a carnivore).

Brugal and Raposo (pers. comm) consider that the Foz do Enxarrique bone assemblage represents for the most part a natural accumulation along the river margin. The human occupation coincided topographically but not behaviourally with the bone scatter (except, perhaps, in the case of red deer) and, therefore, the dated horse teeth are not an anthropic component of the sediments. The depositional environment, suggesting a rapid rate of accumulation, however, warrants their geochronological association with the artefacts. The numerous lithic assemblage remains largely undescribed but is unambiguously Middle Palaeolithic. Raposo and Cardoso (1998b) consider that another open air site, Conceição (Alcochete), is broadly contemporary with Foz do Enxarrique, on the basis of a *c.* 27.2 ka OSL date on wind-blown sediments covering the archaeological level. Since the latter is separated from the former by a major geological unconformity, all that can be safely said about the age of the occupation, however, is that it must be dated between *c.* 27 and, given the OSL result for the underlying deposits, *c.* 75 ka (Table 12.1).

The late survival of Mousterian industries in Portugal documented by Figueira Brava and Foz do Enxarrique is clearly confirmed by the radiometric and chronostratigraphic data available for the two key cave sites of Caldeirão and Oliveira (Almonda karstic system). Under a 2.5 m deep Holocene and Tardiglacial sequence, Caldeirão contains 4 m of Mousterian through to Solutrean

Table 12.1: Radiometric results for the Middle Palaeolithic of Portugal. (sources: Antunes 1990–91; Antunes et al. 1989; Zilhão 1995, 1997; Zilhão and Mckinney 1995; Raposo 1995; Mckinney 1996; Raposo and Cardoso 1998).

Site	Level	Sample	Method	Lab Reference	Age BP	Comment
Almonda, EVS	EVS Cone	*Equus* (tooth enamel)	U-Th	SMU-231E1	35,000±2,000	Low 230Th/232Th ratio
Almonda, Gruta da Oliveira	8	Burnt bone	AMS C14	GrA-10200	31,900±200	Alkaline fraction dated
	9	Burnt bone	AMS C14	GrA-9760	38,390±480	Alkaline fraction dated
	9	Burnt bone	AMS C14	Beta-111967	40,420±1,220	
	Mousterian Cone	*Equus* (tooth enamel)	U-Th	SMU-308[illegible]247E2	53,000+5,600—5,300	Average of the two determinations, *c.* 62,000
				SMU-247E1	70,250±9,000	
Gruta do Caldeirão	K top (J6)	*Cervus*	AMS C14	OxA-5541	18,060±140	Low collagen content (0,32%N; 3,66%C; 0,53%H)
	K base (K5)	*Capra*	AMS C14	OxA-5521	23,040±340	Low collagen content (0,32%N;2,39%C).
	K top	*Cervus*	AMS C14	OxA-1941	27,600±600	
Conceição	C	Sediments	OSL	QTLS-CNC11	27,200±2,500	Layer C overlies the archaeological level; result is minimum age
	E	Sediments	OSL	QTLS-CNC12	74,500+11,600—10,400	Layer E underlies the archaeological level; result is maximum age
Gruta do Escoural	Test 3a, 90[illegible]100	*Bos* (tooth enamel)	U-Th	SMU-248	26,400+11,000—10,000	Low uranium content
	Test 3a, 80[illegible]90	*Cervus* (tooth enamel)	U-Th	SMU-249	39,800+10,000—9,000	Low uranium content (3,4%)
	Test 3a, 60[illegible]70	*Equus* (tooth enamel)	U-Th	SMU-250	48,900+5,800—5,500	
Gruta da Figueira Brava	2	*Patella* sp. shells	C14	ICEN-387	30,930±700	
	2	*Cervus* (tooth enamel)	U-Th	SMU-232E1	30,561+11,759—10,725	
	2	*Cervus* (tooth enamel)	U-Th	SMU-233E2	44,806+15,889—13,958	
Foz do Enxarrique	C	*Equus* (tooth enamel)	U-Th	SMU-225	32,938±1,055	Average of the three results, 33,600±500
	C	*Equus* (tooth enamel)	U-Th	SMU-226	34,088±800	
	C	*Equus* (tooth enamel)	U-Th	SMU-224	34,093±920	
Gruta Nova da Columbeira	16 (=7)	Carbonaceous earth	C14	Gif-2703	26,400±700	Inadequate dating material
	7	Tooth enamel	U-Th	SMU-235E1	35,876+27,299—35,583	
	7	Tooth enamel	U-Th	SMU-238E1	54,365+22,240—27,525	
	20 (=8)	Carbonaceous earth	C14	Gif-2704	28,900±950	Inadequate dating material
	8	Tooth enamel	U-Th	SMU-236E1	60,927+27,405—35,522	
					101,487+38,406—55,919	

Table 12.1: continued

Site	Level	Sample	Method	Lab Reference	Age BP	Comment
Lapa dos Furos	4	*Helix nemoralis* shells	C14	ICEN-473	34,580+1,160–1,010	Layer 4 underlies the archaeological level; result is maximum age
Gruta do Pego do Diabo	3	Bone collagen	C14	ICEN-491	18,630±640	Impure collagen
Pedreira de Salemas	1	Bone collagen	C14	ICEN-366	29,890+1,130–980	
Gruta de Salemas	T.V.b	Bone collagen	C14	ICEN-379	24,820±550	Dated level contains a mix of Middle and Upper Palaeolithic artefacts
Santo Antão do Tojal	2	*Elephas* (bone)	U-Th	SMU-305	81,900+4,000–3,800	
Vilas Ruivas	B	Sediments	TL	BM-VRU1	51,000+13,000–12,000	Average of the two results, 54,000/+12,000/-11,000
	B	Sediments	TL	BM-VRU2	68,000+35,000–26,000	

deposits which have been the object of a magnetic susceptibility study (Ellwood *et al.* 1998). The palaeoclimatic curve obtained almost perfectly matches the record from deep-sea sediments off the Portuguese coast, with the LGM around 20 ka, followed by a temperate peak around 18 ka (Figure 12.3). The warm nature of OIS 3 climates in the region inferred from the susceptibility data is supported by other lines of evidence. The *Helix nemoralis* mollusc fauna dated at Furos, for instance, is indicative of an open woodland/maquis environment. The contemporary pollen profiles studied by Diniz (1993a, 1993b), in turn, suggest a landscape of heathland and pine on the coast and on the sandy soils of the interfluves, with oak woodlands covering the low altitude limestone massifs.

The fact that the available palaeoclimatic evidence places the Middle-Upper Palaeolithic divide at Caldeirão in early OIS 2 independently confirms, therefore, the date of *c.* 28 ka obtained at the top of the Mousterian sequence (Table 12.1). The validity of this result is further reinforced by the stratigraphically coherent column of radiocarbon dates obtained for the overlying Upper Palaeolithic levels. Similar results are now available for the Almonda karstic system (Figure 12.4), where work began in the wake of the discovery of a small archaeological deposit in the labyrinth of narrow fossil galleries above the spring of the Almonda river. This 'Mousterian Cone' represented the bottom of the fill of a collapsed cave, sealed by eboulis and breccia, which has already been reopened and is currently under excavation – the Gruta da Oliveira.

Sampling of 0.25m^2 of the Mousterian Cone yielded some 250 artefacts, about half of them flint, the rest being quartzite (*c.* 30%), quartz (*c.* 20%) and limestone (<1%). The flint material is characterised by the debitage of thin, large flakes and blades and has an important Levallois component. The faunal assemblage included turtle, rabbit, some 150 long bone fragments of large mammals (30% of which were burned), and many teeth (ibex, red deer, rhino and horse). Two early uptake U-series dates were obtained from the enamel of a single horse tooth, suggesting an OIS 4 age for the base of the Oliveira sequence (Zilhão and Mckinney 1995). This result is compatible with the abundance of open space species, almost entirely absent from Oliveira's uppermost archaaeological level (level 8), which is overwhelmingly dominated by red deer and has been radiocarbon dated to *c.* 32 ka (Table 12.1).

During level 8 times, the cave was already almost completely filled up, so the site functioned more like a small rock-shelter, with occupation taking place in a restricted 4m^2 area of the former porch, at the bottom of a chimney opened to the outside in the framework of a major episode of roof collapse. The lithic assemblage is small – the tools and debitage greater than 2.5cm form a total of 95 items – and made of quartzite (60%) and flint (35%). A preliminary study characterises Level 8 as proportionately poor in retouched pieces (8, mostly notches and denticulates) and featuring a well developed Levalllois flake production, especially on fine-grained quartzites, where ovoid and triangular shapes are dominant and dorsal scar patterns tend to be radial or part radial (Marks pers. comm.). This is also the case at Foz do Enxarrique (Raposo *et al.* 1985) and in Level K of Caldeirão (Zilhão 1995, 1997): there is absolutely no evidence of an autochthonous or externally influenced change towards a blade-based Upper Palaeolithic technology.

Human remains from Oliveira include a hand phalanx in Level 9 and a proximal ulna in Level 10. Although none of these pieces is anatomically diagnostic, their chronology (*c.* 39 ka for Level 9) and associated Mousterian material suggest that these remains are of Neanderthals.

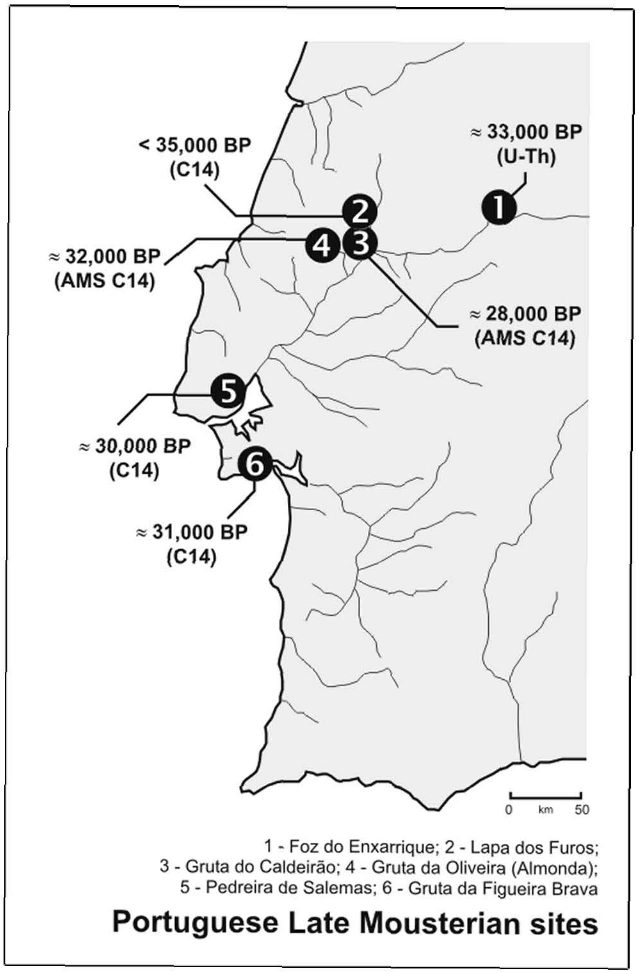

Figure 12.2: Portuguese Mousterian sites reliably dated to less than 35 ka.

The radiometric chronology of the Portuguese late Mousterian is independently confirmed by the fact that the earliest Upper Palaeolithic is represented by Aurignacian industries that are both chronologically and typologically late (Zilhão 1995, 1997). This late Aurignacian is known from small-sized but characteristic assemblages recovered in caves, featuring Dufour bladelets of the Dufour subtype that are non-existent in later Upper Palaeolithic times. At the site of Pego do Diabo, north of Lisbon, one such context was dated to *c.* 28 ka (Table 12.2). Coupled with the evidence from Caldeirão, this indicates that, in Portugal, the replacement of the Mousterian by the Aurignacian took place between *c.* 27 and *c.* 29 ka.

The other known aspect of the Portuguese Aurignacian are the open air workshop sites of the Rio Maior region (Heleno 1944, 1956; Zilhão 1995, 1997). Residential sites of the kind exemplified in France, for instance, by the Castanet rock-shelter, have not yet been found, but their existence is predicted by the features of the lithic production system inferred from the industrial composition of logistical and workshop sites (Figure 12.5). This system is characteristically Aurignacian, featuring the exploration of large single platform cores for the production of regular, thin blades with abraded platforms that, on average, are almost twice as large as those from later Upper Palaeolithic times. Thick 'burins' and 'scrapers' of different types were used as cores for the extraction of blanks for Dufour bladelets. Those of the Dufour subtype, flat and bilaterally pointed by a combination of marginal direct retouch and invasive, semi-abrupt, ventral retouch, stand out very clearly, by these technological attributes and by their metrics, from the kinds of bladelets with inverse retouch sometimes found in subsequent Gravettian and Proto-Solutrean industries (Figure 12.6). Typological and technological comparison with the Aquitaine sequence indicates that this is late Aurignacian, given the absence of typical 'Aurignacian' retouch on blades and the clear predominance of 'burins', including busked and Vachons forms, over-carinated and nosed 'scrapers'.

The cultural diversity of the latest Neanderthals

A situation similar to that which I have just described for Portugal exists in all Iberian regions located south of the Ebro basin. The survival of Mousterian industries until *c.* 30 ka, which is documented at Zafarraya, is confirmed in the Meseta by the dates for Level 2 of the Jarama VI cave, in Guadalajara (García 1997): 29.5±2.7ka (Beta-56638) and 32.6±1.86ka (Beta-56639). Furthermore, as confirmed by the recent results for Gorham's (Pettitt, this volume), no dates earlier than *c.* 30 ka exist for the Upper Palaeolithic of southern Iberia and Valencia (those available for Beneito – Iturbe *et al.* 1993 – clearly come from disturbed contexts). In these regions, the stratigraphic sequences spanning the Middle-Upper Palaeolithic divide, such as Bajondillo (Cortés *et al.* 1996) and Cariguela (Vega 1990), always lack Aurignacian 0 or Aurignacian I levels.

In Cantabria and northern Catalonya, by contrast, it has been suggested that the earliest Aurignacian is some 10 ka earlier. The archaeological meaning of the available dates, however, is debatable. As exhaustively argued elsewhere (Zilhão and d'Errico 1999a), there are grounds to believe that, in the area of the new excavations, El Castillo's Level 18 is a mostly Middle Palaeolithic palimpsest. At l'Arbreda, the homogeneous nature of the sedimentary sequence, the importance of cave bear denning, and the fact that the site was excavated in artificial horizontal units in spite of the dip that characterised the relevant section of the deposits, may explain the several instances of stratigraphic inversion of results and in any case shed doubt on the assertion that the Aurignacian occupation of the site began *c.* 38.5 ka. Stratigraphically reliable results have been obtained for other sites in the Franco-Cantabrian region, such as La Viña (Fortea 1995) or Isturitz (Turq pers. comm.) which suggest that, in fact, its earliest Aurignacian dates to no more than *c.* 36.5 ka.

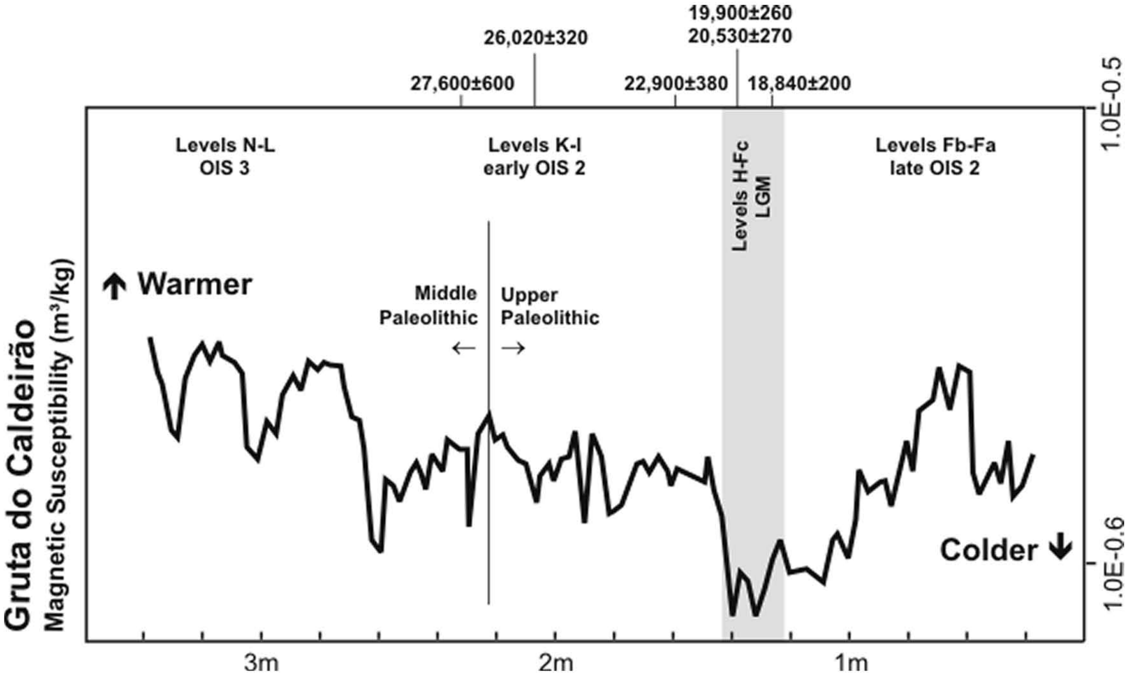

Figure 12.3: The magnetic susceptibility curve for the Mousterian through Solutrean sequence at Gruta do Caldeirão.

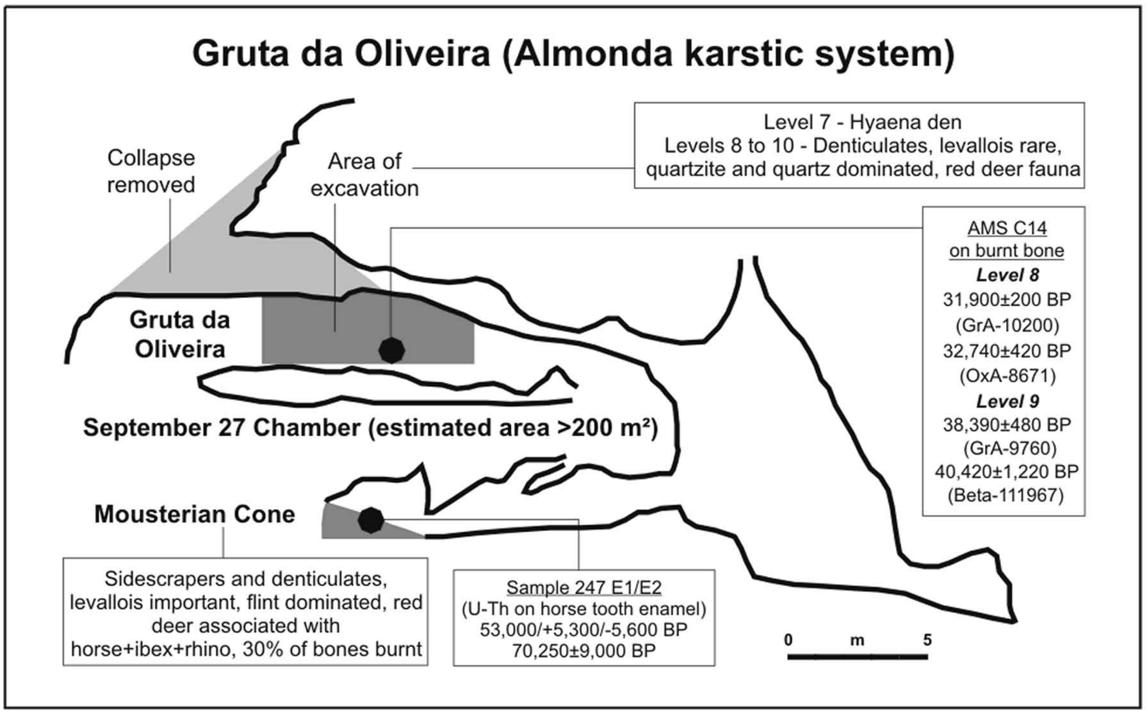

Figure 12.4: Gruta da Oliveira (Almond karstic system, Torres Novas). Schematic profile.

Table 12.2: Radiometric results for the earliest Upper Palaeolithic of Portugal (sources: Zilhão 1995, 1997).

Site	Level	Sample	Method	Lab Reference	Age BP	Comment
Gruta do Caldeirão	Jb	Bone collagen	AMS C14	OxA-5542	26,020±320	Non-diagnostic early Upper Palaeolithic with blades and
Gruta do Pego do Diabo	2b	Charcoal	C14	ICEN-306	2,400±80	Intrusive
(Aurignacian)	2a	Bone collagen	C14	ICEN-490	23,080±490	Contaminated? (level 2 is surface in sampled area)
	2b	Bone collagen	C14	ICEN-732	28,120/+860/-780	
Vale Comprido — Cruzamento	—35	Burnt flint	TL	BM-VCO1	12,400±2,100	
(early Gravettian)	—40	Burnt flint	TL	BM-VCO6	26,700±2,700	Average of the two acceptable results, 27,900±2,200
	profile	Burnt flint	TL	BM-VCO12	30,300±3,900	

Note: experimental TL dates in the range of *c.* 40 ka have been obtained for the open air sites of Fonte Santa and Gato Preto; although the British Museum laboratory could not provide a fully satisfactory explanation for the large error, these dates are totally incompatible with the nature of the archaeological assemblages, which suggest ages of *c.* 23—25 and 21—22 ka for these sites

Even so, this is still significantly earlier than the age of no more than *c.* 30 ka for the end of the Mousterian in Portugal, Andalucia, Valencia and the Meseta.

This upward revision of the values for the age of the earliest Aurignacian that are currently accepted on the basis of l'Arbreda and El Castillo does not affect, therefore, the empirical basis of the Ebro frontier model. By contrast, its impact on models that explain the Châtelperronian as a product of acculturation brought about by Neanderthal contact with the first waves of modern human immigrants is devastating, since it confirms what was already shown by a simple consideration of the chronostratigraphy of the region (there now are some 30 sequences documenting a Châtelperronian under an Aurignacian 0 or an Aurignacian I, and the 'interstratifications' at Le Piage, Roc-de-Combe and El Pendo result from processes of postdepositional disturbance): that the emergence of the Châtelperronian (AMS radiocarbon dated at *c.* 38 ka at Combe-Saunière, Grotte XVI and Roc-de-Combe, and at *c.* 45 ka at the Grotte du Renne) predates the arrival of modern humans and, therefore, can only be considered as an independent, authochthonous Neanderthal transition to the Upper Palaeolithic (d'Errico *et al.* 1998; Zilhão and d'Errico 1999a, 1999b).

The significance of the Châtelperronian to our understanding of Neanderthals cannot be simply dismissed by invoking a process of acculturation inevitably brought about by long-term contact with neighbouring populations of modern newcomers spreading east-west along the 43rd parallel. This is also indicated by the fact that throughout the several millennia of co-existence with Aurignacian people living north of the Ebro frontier, Iberian Neanderthals did not undergo any significant change in their material culture. Coupled with the fact that Cantabro-Pyrenean moderns did not invade their territories for such a long period of time, this empirical fact alone challenges the notion of an overwhelming, biologically-based, intellectual inferiority of Neanderthals that underlies prevalent explanations of their extinction (*cf.* Mellars 1996, for instance). In the framework of the stratigraphically and radiometrically documented precedence of the Châtelperronian relative to the Aurignacian, the Ebro frontier pattern is one more reason to doubt that such a notion can be used to explain away the bone tools, the body ornaments and the lithic technology of the Châtelperronian as a simple by-product of 'imitating, but not understanding, modern symbolical behaviour' (Stringer and Gamble 1993). The facts, instead, are that most features of the so-called Upper Palaeolithic package are now well documented in Neanderthal Europe at least since last interglacial times; that the Châtelperronian evolved from the local MTA, and its lithic technology shows absolutely no Aurignacian influence; and that the same is true of the rich and diverse collection of bone tools and ornaments recovered in levels VIII-X of Grotte du Renne, at Arcy, where their association with both the Châtelperronian lithics and the human bones recently confirmed by Hublin *et al.* (1996) to be of a Neanderthal child is unquestionable (d'Errico *et al.* 1998).

The implication of these facts is, first, that the 'Upper Palaeolithic package' as defined thirty years ago is a misrepresentation of reality, inspired by a view of human evolution proceeding through 19th century-type universal

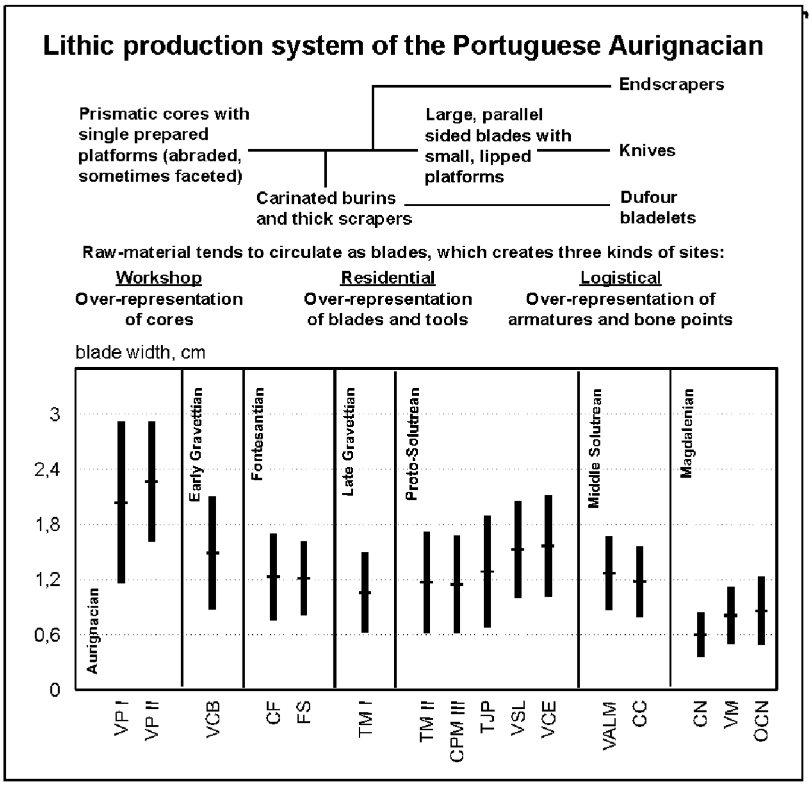

Figure 12.5: The lithic production system of the Portuguese Aurignacian. The large size of elongated products (blades and bladelets) is unmatched in subsequent periods.

stages. As a technologically based subdivision of time, the concept retains its utility only if redefined as the period of Eurasian Prehistory that is characterised by the production of bladelets and the use of microliths. This technological trait should not be taken, however, as in any way correlated with developments in other realms of life, let alone the development of biologically-based intellectual capabilities. It has been demonstrated, in any case, that it takes more intelligence to make an upper Acheulian handaxe than a Levallois point or, for that matter, than to extract a blade from a prismatic core (Wynn 1989). It is also an indisputable fact that symbolic behaviour is present in societies of the ethnographic present that, from the point of view of lithic technology, are 'Lower Palaeolithic'.

In this regard, one should always bear in mind, when attempting to measure intelligence through technology, that fully modern humans, anatomically and behaviourally, such as the Tasmanian Aborigines of two hundred years ago, had a tool-kit comprising no more than a dozen different kinds of quite simple artefacts and did not know how to produce fire (Ryan 1996). In any case, the Châtelperronian assemblages from Grotte du Renne are empirical evidence that there is no necessary link between the cultural features of the so-called 'Upper Palaeolithic package' and anatomical modernity, and that the appearance of personal ornaments must be related instead to the operation of social processes connected with the establishment of territoriality and ethnicity, which are ultimately dependent on the density of populations and the intensity of social interactions. Adaptationist explanations of the appearance of ornaments, relating it to the need for the social identification of individuals involved in long-distance alliance networks have been put forward in the past, notably by Gamble (1983). Such explanations are strengthened by the fact that, on present evidence, it is among the Neanderthals from northern Europe and the modern humans living in structurally similar environments at the other end of the world, in South Africa, that the use of personal ornaments and the mass utilisation of red ochre are simultaneously documented for the first time in the history of humankind, between 40 and 50 ka.

Uneven development and extinction in Neanderthal Europe

The temporal precedence of the Châtelperronian over the Aurignacian and the evidence from Grotte du Renne indicate that Neanderthal groups in central and western Europe were undergoing their own independent 'symbolic revolution' at the time of contact with Aurignacian modern humans ultimately originating in the Near East. As was the case in the historical trajectory of modern humans, this revolution, however, was a geographically uneven process. At the same time that central and western

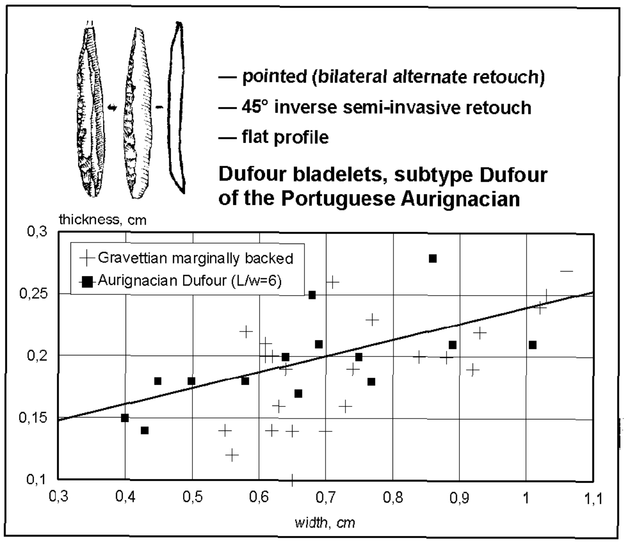

Figure 12.6: Typology and metrics of Portuguese Aurignacian Dufour bladelets compared with the marginally backed bladelets of the Gravettian and the Proto-Solutrean.

European Neanderthals were becoming technologically Upper Palaeolithic and were starting to experiment with personal ornaments, Iberian Neanderthals continued to be fully 'Middle Palaeolithic' and remained so until the end. At that time, such was also the case with North African moderns, who did not become 'Upper Palaeolithic' until well after 30 ka.

These patterns suggest that the replacement of Neanderthals by modern humans should be looked at simply as another instance of contact between isolated populations with different, albeit largely parallel, cultural trajectories. In this case, as has often been documented in both the historical and the ethnographic records, the long-term outcome of contact was that one of those trajectories was truncated and the corresponding genetic lineage went extinct. This may be explained through the action of a number of factors operating in the realms of immunology, fertility or social organisation. The notion of a biologically based intellectual inferiority is no more required to explain the extinction of Neanderthals than that of Aboriginal Tasmanians or Fueguian Indians. Such an epistemologically primitive notion is based on an a-historical understanding of human behaviour and is flawed at a basic logical level by the systematic practice of anachronistic comparisons.

Examples of these flaws can be found in many otherwise excellent works dealing with the Neanderthal problem. A study of Neanderthal *versus* modern human subsistence practices, for instance, compares Italian Neanderthals with modern human groups from the same region that are 20 or 30 ka younger, not with contemporary modern humans from different regions, such as the Middle East (Stiner 1994). This approach makes sense only if one assumes that the two kinds of humans have fixed behavioural characteristics and that any one group of modern human hunters can be compared with any one group of Neanderthals, regardless of the place they occupy in absolute time or in concrete historical trajectories. This particular instance of anachronistic reasoning is all the more significant since, at the same time, the author clearly states her position in favour of a view of the origins of modern human ecological behaviour as caused by 'selection upon variation in the context of widespread environmental (including social) forces' as opposed to 'diffusion of genius' (p. 387). Often, reductionism has also led, on the other hand, to a double standard in the evaluation of the archaeological record, particularly in regard to the interpretation of faunal remains. While head-dominated or head-and-foot dominated Eurasian Middle Palaeolithic assemblages were attributed to scavenging Neanderthals, the same kinds of assemblages produced by modern humans in the Upper Palaeolithic, or even in the Neolithic, were explained as a product of the operation of taphonomic agents over the remains of actual kills of wild or domesticated animals. As shown by Marean and Kim (1998), it turns out that, when an adequate methodology is applied, Middle Palaeolithic faunal assemblages are shown to be a product of the same kinds of hunting practices that are documented in the Upper Palaeolithic.

Why such reductionist arguments have found so much favour among students of human evolution is all the more difficult to explain since sophisticated models of interaction put forward by leading biologists have been available for a long time, even if published under the unorthodox form of B. Kurtén's pre-historical novels (Kurtén 1980, 1986). In any case, the late survival of Neanderthals in Portugal and southern Spain represents an excellent opportunity to test competing explanatory models of Neanderthal extinction. In fact, unless we go back to 19th century notions of a north-south gradient in human intelligence – i.e., Iberian Neanderthals were even dumber than French ones, which at least were able to imitate – the Ebro frontier pattern cannot be explained at all in the framework of the paradigm of a biologically based intellectual inferiority of Neanderthals.

Geographical/adaptationist models, on the contrary, perform a lot better at explaining why Iberian regions located south of the Ebro were lagging behind in the cultural revolution unfolding further to the north since about 50 ka. Contrary to popular notions, Neanderthals cannot be simply described as a 'cold-adapted species'. Instead, they occupied a wide range of habitats, including the open woodlands that covered extensive regions of Iberia throughout the early last glacial. Thus, while, north of the Ebro, the cultural revolution of Neanderthals may have been unleashed by population packing in steppe environments with large herds of gregarious herbivores, further to the south, a more sparse occupation of a more wooded landscape may have allowed the survival of less stressed, non-ritualised, 'Middle Palaeolithic' life ways.

In the beginning of OIS2, with the onset of the trend towards maximum glacial conditions, the human range was compressed at its northern end and, probably for the first time in the Late Pleistocene, the kinds of environments to which Aurignacian moderns had adapted to expanded southwards into Iberia, and they expanded southwards with them. When this happened, demographic and biogeographic laws alone *a priori* guaranteed the swift extinction of those last Neanderthals who had continued to thrive in the Iberian regions south of the Ebro basin since moderns first arrived in Western Europe.

Conclusion

Iberian regions located south of the Ebro are probably the only part of the world where traditional views of the transition from the Middle to the Upper Palaeolithic, as a process of population replacement at both the biological and the cultural levels, entailing the replacement of the Middle Palaeolithic by a full package of Upper Palaeolithic biocultural features, are compatible with the empirical evidence.

Paradoxically, the spatial and temporal features of the Iberian process indicate, at the same time, that the link of causality between modern anatomy and so-called modern behaviour proposed by many as the explanation for the symbolic revolution of the Upper Palaeolithic is non-existent. This clarification opens up new perspectives for the understanding of what may have been the rich processes of interaction that occurred when Neanderthals and modern humans established their own 'close encounters of the third kind'.

It may well be true that, as a result of such encounters, the genes of Neanderthals may have been completely or almost completely lost, as suggested by some interpretations of the DNA results obtained by Krings *et al.* (1997). The evidence from Grotte du Renne and other sites, however, indicates that Neanderthals may have been the first humans to wear personal ornaments and to manufacture sophisticated bone tools, i.e., that, in Europe, modern humans may well have been the acculturated, not the acculturators. Thus, regardless of what happened in terms of population biology, in cultural terms Neanderthals must indeed be counted among our direct ancestors. The recent find at the Abrigo do Lagar Velho (Lapedo, Leiria, Portugal) of the buried skeleton of a 25,000 year old modern human child with Neanderthal traits (Duarte *et al.* 1999), however, indicates that Neanderthals may also have contributed, through extensive admixture of anatomically archaic and anatomically modern groups at the time of contact, to the gene pool of the earliest Upper Palaeolithic peoples of Iberia.

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