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## WITHIN PROJECTILE RANGE

### Some Thoughts on the Appearance of the Aurignacian in Europe

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*The Aurignacian has long been interpreted as the culture that corresponded to the arrival of modern humans in Europe and, along with them, all the constituent elements of the Upper Paleolithic. In addition to noting the profound technological changes, we emphasize in particular the systematization and diversification of personal ornaments and the emergence of graphic arts. While not denying the impact of such transformations, and not questioning their close association with the Aurignacian, our objective here is to place them in their archaeological context in order to show that their development was not sudden but in fact more gradual than is usually considered. With respect to the internal chronology of the Aurignacian, we thus depict a more complex image of the Middle to Upper Paleolithic transition, attenuating the impression of an abrupt and radical break that generally surrounds its interpretation.*

IN THE CULTURAL EVOLUTION OF PREHISTORIC SOCIETIES, the full development of ornamental objects and graphic representations on portable artifacts or rock walls is often considered a characteristic of what is defined as “modern” behavior. Moreover, these manifestations are thought to be closely associated with “our humanity” through humans who were behaviorally as well as anatomically modern (e.g., Henshilwood and Marean 2003; Klein 2000, 2003; Stringer and Gamble 1993). In debates concerning the emergence and development of this human type, several scenarios have been proposed, the most widespread of which posits a single African origin for our species (Mellars 2005; Stringer 2002). Applied to the European archaeological context, this scenario envisions the replacement of autochthonous Neandertal populations by modern humans from Africa who arrived on the European continent around 40,000 to 35,000 years ago (Bar-Yosef 1998; Demars and Hublin 1989; Mellars 1989, 2004). Emphasis is

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usually placed on the great behavioral complexity of this new humanity and its beneficial, adaptive advantages in the context of its geographic expansion and resultant encounters with indigenous, non-anatomically modern populations. To distinguish the behavioral characteristics of these populations, trait lists were generated and, based on those lists, the concept of “cultural modernity” was developed (e.g., d’Errico 2003; Henshilwood and Marean 2003; Klein 2000; McBrearty and Brooks 2000). By consensus among the scientific community, one of the principal criteria used to determine “modernity” is the creation of objects imbued with symbolic meaning (Henshilwood and Marean 2003). This is the case, for example, of personal ornaments, graphic representations, or even tools astutely fabricated in a manner that allows identification of the author or group to which they belong. In this context, rather than evoking behavioral modernity, Henshilwood and Marean speak of a “fully symbolic sapiens behavior”:

Finally, we stress “fully symbolic”; only when anatomically modern humans fully implement an inbuilt capacity for symbolically driven behavior (a capacity that may have developed over tens or even hundreds of millennia) can they be considered “fully modern” (2003:644).

### **BEHAVIORAL MODERNITY AND THE EMERGENCE OF THE AURIGNACIAN**

In Europe, the idea of linking the Aurignacian to new behavioral practices is quite old, and the development of this culture has often been characterized as an abrupt break marking the passage from the Middle to the Upper Paleolithic. When Henri Breuil (1913) correctly placed the Aurignacian into the prehistoric chronology of Europe, during the famous intellectual “battle” named for this culture (Dubois and Bon 2006), he was the first to assert the existence of a clear rupture during the Paleolithic era. This was in contrast to the continuous, linear evolution asserted until then, notably by Gabriel de Mortillet. To a certain degree, the Aurignacian has since been considered one of the first “historic” episodes of humanity, attesting to the movement of populations and intergroup competition. In the end, the very definition of the Upper Paleolithic directly follows from this interpretation.

This emphasis on a cultural break is based in part on the generalization of new behaviors in the realm of technical activities (blade and bladelet tools, the development of osseous industries), as well as in the multiplication of symbolic and graphic manifestations. This viewpoint has had a durable influence on prehistoric research. For example, Mellars recently defined the Aurignacian as follows:

Significantly, the Aurignacian period shows an apparently sudden flowering of all the most distinctive of fully “modern” (or, in archaeological terms, Upper Paleolithic) cultural behaviours. Such features include the first complex and carefully shaped bone, antler and ivory tools; a sudden proliferation of perforated animal teeth, far-travelled marine shells, carefully shaped stone and ivory beads and other forms of personal ornaments; and (at least in sites in central and western Europe) remarkably varied

and sophisticated forms of both abstract and figurative art, ranging from engraved outlines of animals, to representations of both male and female sex organs, to the remarkable ivory statuettes of animal and human figures from southern Germany and the elaborate cave paintings of Chauvet cave in southeastern France (2004:461).

It is increasingly clear, however, that this classic perception of the Aurignacian no longer corresponds to the reality of the archaeological evidence. In particular, we can reconsider the suddenness of the appearance of the traits used to define this culture through an examination of its different expressions. This paper is dedicated to this perspective, as well as its consequences for our understanding of the Middle to Upper Paleolithic transition.

### AURIGNACIAN FORMS OF EXPRESSION

We can no longer consider the Aurignacian as a homogeneous and monotone culture, distributed without variation from one end of Europe to the other. On the contrary, its multiple forms of expression and internal chronological divisions emphasize the complexity of this famous “transition” from the Middle to Upper Paleolithic (e.g., Straus 2005). Since the early twentieth century, multiple internal typo-chronological classifications have been proposed to summarize the evolution of Aurignacian industries. Temporal change in the bone and lithic tool forms of the Aurignacian has long been widely recognized (e.g., Delporte 1984, 1991; Demars 1992; Peyrony 1933; Sonnevile-Bordes 1960, 1982). Moreover, several authors have insisted on the existence of a very ancient Aurignacian stage, preceding the classic Aurignacian I with its split-based antler points. Designated in the Aquitaine Basin as Aurignacian 0 (Delporte 1984; Djindjian 1993) or Aurignacian Ia (Demars 1992), these industries lack precise typo-technological definition and frequently include rolled and polished pieces indicating complex postdepositional phenomena and mixing between distinct cultural layers (Bordes 1998, 2000). For this reason, the definition of a pre-classic Aurignacian I stage is moot.

For our understanding of the pre-Aurignacian, we were clearly inspired by the work of Laplace (1966), who recognized a dichotomy between lithic industries with long retouched bladelets and industries with carinated scrapers and robust blades with lateral retouch (Aurignacian blades and strangled blades, for example). This dichotomy has recently been found in numerous studies (e.g., Bon 2002; Bon et al., eds. 2006; Bordes 2006; Kuhn and Stiner 1998; Teyssandier 2007). The distinction between these two facies, originally recognized through strictly typological analyses, is now supported by technological studies oriented toward understanding the objectives of lithic production and the methods used to achieve them. Two principal technical traditions have thus been revealed: the Protoaurignacian (on the question of the terms used to designate this facies, see Bon 2006a) and the Early Aurignacian (also known as Aurignacian I), the latter being the founding facies of the Aurignacian *sensu lato*.

These facies are distinguishable from each other both by their tools and by the operational schemes (reduction sequences) or global organization of

tool production. In the Protoaurignacian (Figure 1), emphasis is placed on the fabrication of long rectilinear bladelets, which are transformed into pointed bladelets by bilateral direct retouch (so-called Krems and Font Yves Points; Figure 1e–g) and/or bladelets with alternate retouch (Dufour bladelets *sensu stricto*; Figure 1h–j). They are produced from unidirectional cores, often with a pyramidal morphology (Figure 1a). These cores, either on blocks or flakes, enable detachment of rectilinear bladelets from the center of the flaking surface, a technological feature observed both in central (Teyssandier 2006, 2007) and western (e.g., Bon 2002; Bordes 2006) Europe. Striking platforms are mostly unafaceted, and blanks were extracted by direct percussion with soft, organic hammers. These blade cores furnish the entire range of desired products. Burins and endscrapers on blades are common (Fig. 1d), whereas lateral retouch is rare and Aurignacian retouch virtually absent.

In the Early Aurignacian (Figure 2), on the other hand, two distinct reduction sequences are employed. One produces robust blades that are clearly distinct from the slender blades of the Protoaurignacian, which are formed by the reduction of prismatic cores (Fig. 2a); the “ideal” blade (i.e., that which will be used as a tool blank) is large and, above all, wide and thick; its profile is in general curved, and some cortex often remains. Pre-forming of cores tends to be minimal: crests are rather uncommon, and not well made. The single striking platform is rejuvenated

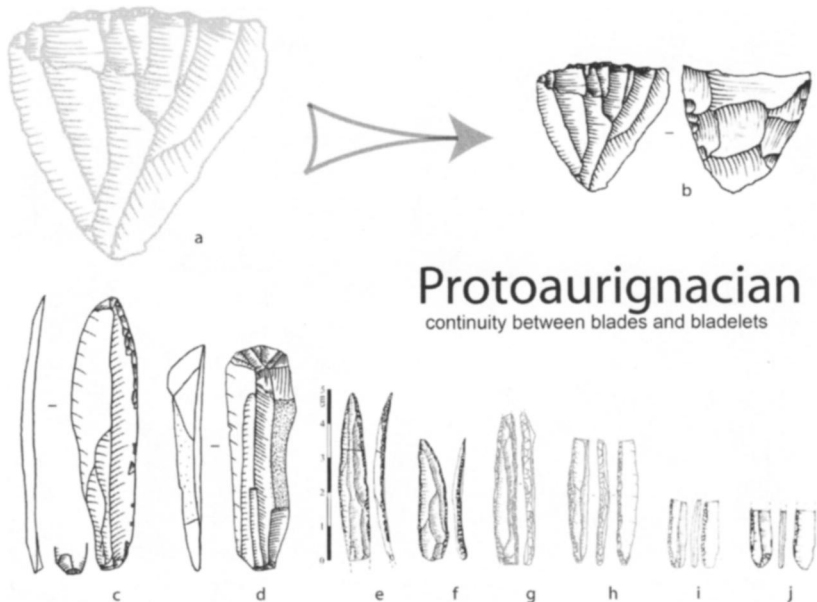


Figure 1. Organization of lithic production and characteristic tools of the Protoaurignacian.

a: virtual core illustrating the continuity between blades and bladelets; b: bladelet core (Krems-Hundssteig, after Teyssandier 2007); c: slender blade with some retouch (Le Piage, after Bordes et al. 2008); d: endscraper on slender blade (Le Piage, after Bordes et al. 2008); e–f: Krems points (Tincova, after Hahn 1977); g: bladelet with bilateral retouch (Le Piage, layer K, after Bordes et al. 2008); h: Dufour bladelet (Le Piage, layer K, after Bordes et al. 2007); i–j: Dufour bladelets (i: Krems, after Hahn 1977; j: Kozarnica, after Tsanova 2006)

through the removal of thick core tablets. The removal of blades always involves direct percussion using soft, organic hammers, and the striking surface is carefully prepared: faceted or spur butts predominate. The blades were used as blanks for “domestic” tools (Tartar et al. 2006), principally endscrapers (Fig. 2b) and laterally retouched blades that could be resharpened repeatedly (Aurignacian blades).

The other sequence produces short bladelets with a relatively curved profile (Figure 2e–g). They are made from carinated cores (Figure 2c–d), named to reflect their primary use to produce the emblematic carinated scrapers, the chief contributors to the classic typological identity of the Aurignacian in general. (For a discussion of bladelet production in the Aurignacian sequence, see Le Brun ed. 2005.) They vary between 2 and 4 cm long and they are seldom retouched; the rare evidence of retouch (semi-abrupt and marginal) tends to be inverse and on the right edge (Figure 2g). In the Early Aurignacian, we thus observe an individualization of lithic reduction sequences based on the activities for which the end products would be used (e.g., the “opposition” of domestic vs. hunting tools; Tartar et al. 2006). This individualization of functional spheres is also apparent in the domain of organic materials, which exhibit an economy of use based on raw material type (Liolios 1999, 2006). Antler was chiefly selected for the production of split-based points and percussion implements; bone was used for making awls, polishers, and retouchers; and ivory was preferred for mobiliary art and ornaments (Teyssandier and Liolios 2003:188).

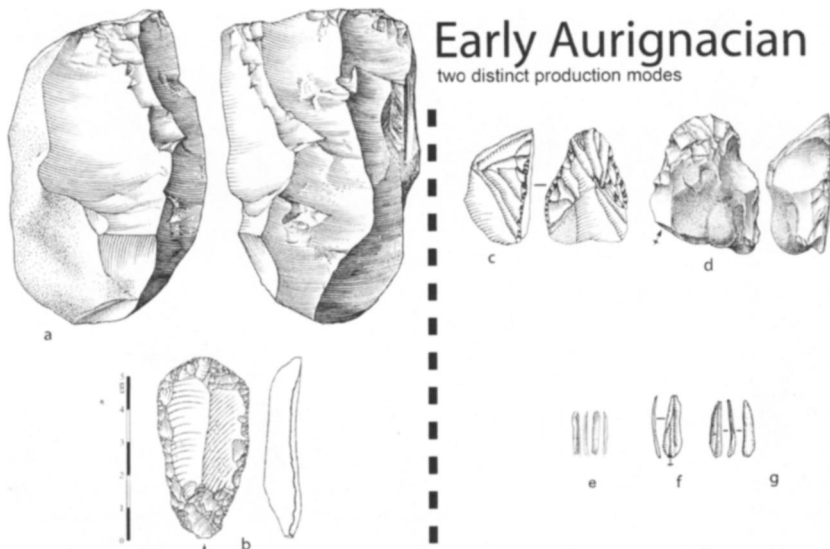


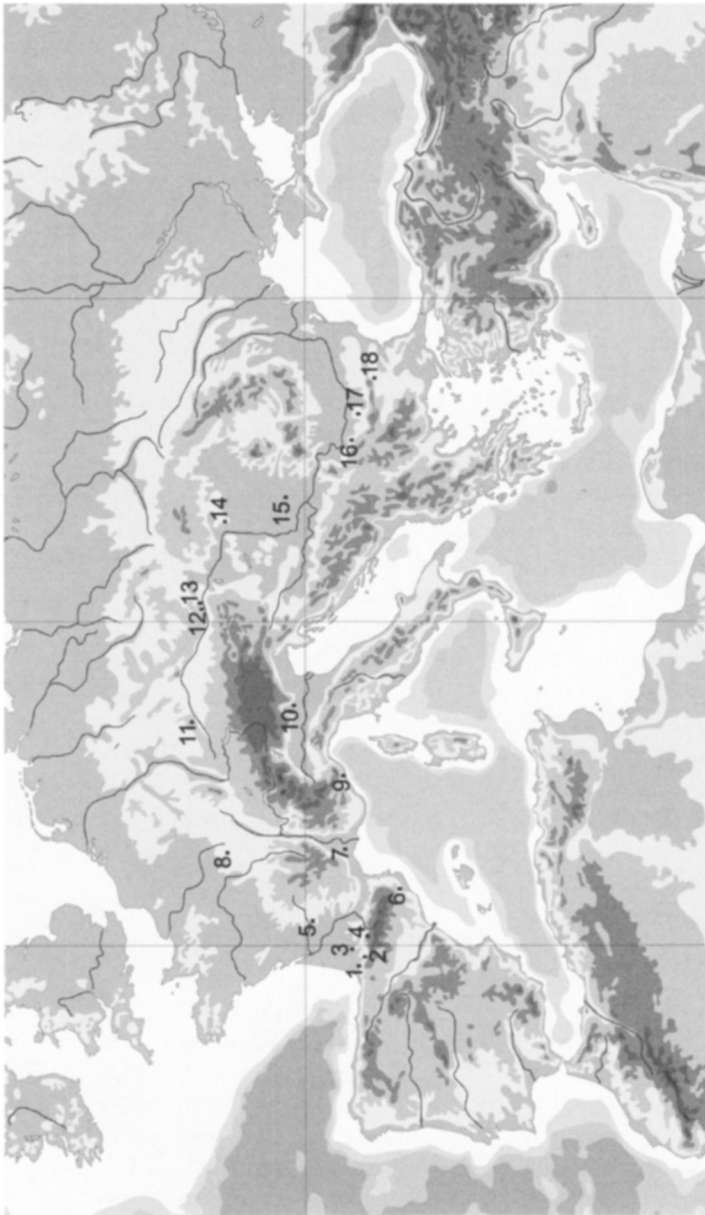
Figure 2. Organization of lithic production and characteristic tools of the Early Aurignacian.

a: unipolar blade core (Caminade, layer F, drawing by J-G. Marcillaud); b: endscraper on retouched blade (Le Piage, layer B); c–d: carinated core (“endscraper”) with a wide retouched edge (c: Geissenklösterle, AH III, after Teyssandier 2007; d: Caminade, layer F, drawing by J-G. Marcillaud); e, g: retouched bladelets (e: Corbiac-Vignoble 2; g: Geissenklösterle AH II, after Hahn 1988); f: unmodified bladelet (Geissenklösterle AH II, after Teyssandier 2007)

The chronological relationships between these two Aurignacian forms of expression have long been unclear, especially given that the identification and individualization of the Protoaurignacian was not immediately accepted (e.g., Djindjian 2006). When Laplace (1966) first defined this industry and accorded it not only an initial position in the Aurignacian archaeological sequence but also a central role in the process that he proposed for the passage from the Middle to the Upper Paleolithic, few authors agreed with his interpretation. Though the concept of the Protoaurignacian was later reintroduced for the western Mediterranean (e.g., Bazile and Sicard 1999; Onoratini 1986), the absence of a clearly definable typical Early Aurignacian in that region prevented a precise evaluation of the relationship between the two “stages.”

New data have since confirmed the existence of the Protoaurignacian and its anteriority relative to the Early Aurignacian. In particular, ongoing excavations at Isturitz (Pyrénées-Atlantiques) and Le Piage (Lot) illustrate the stratigraphic precedence of industries with long, rectilinear bladelets relative to those of the Early Aurignacian with short, curved bladelets associated with split-based points (Bordes 2002, 2006; Normand 2006; Normand and Turq 2005). This same stratigraphic succession also exists at Gatzarria (Pyrénées-Atlantiques; Laplace 1966), Les Abeilles (Haute-Garonne; Eizenberg 2006; Laplace 1966), Labeko Koba (Guipúzcoa; Arrizabalga 2006) and Brassempouy (Landes; Arrizabalaga et al. 2007; Bon et al. in press; Henry-Gambier et al. 2004b). From the Aquitaine to the Cantabrian region (Figure 3), therefore, numerous archaeological sequences show that the Protoaurignacian clearly precedes the appearance of the typical Aurignacian with its split-based points. The situation is less clear in the Mediterranean region, however, where the development of an Early Aurignacian comparable to that of the classic sequences in the Aquitaine has not, in our opinion, been clearly demonstrated (see for example, the sequences of Arbreda [Catalonia], Esquicho Grapaou [Provence], and Fumane and Mochi [northern Italy]; Bartolomei et al. 1994; Bazile 2006; Bazile and Sicard 1999; Blanc 1953; Broglio et al. 1996, 2005; Kuhn and Stiner 1998; Onoratini et al. 1999). One point is certain, however: the Protoaurignacian in this region occupies an initial position in the Upper Paleolithic sequence.

As stated above, the long-accepted, exclusively Mediterranean origin for these industries can now be questioned. And, in fact, their geographic reach extends beyond the incursions into the Atlantic zone to which we have referred. By the 1960s, Broglio and Laplace (1966) had already compared the rich series of Krems-Hundssteig in Lower Austria with the Mediterranean Protoaurignacian. A recent technological study confirms their analysis but documents the complexity of this site in which the Early Aurignacian and Protoaurignacian cannot be ordered stratigraphically (Teyssandier, 2003, 2006, 2007). Other recent reanalyses considerably enlarge the geographic extension of these Protoaurignacian industries, as with the assemblage from level VII of Grotte du Renne at Arcy-sur-Cure in Burgundy (Bon 2002; Bon and Bodu 2002). Moreover, as is already attested by the Krems assemblage, this phenomenon is not restricted to western Europe: it



- 1 Isturitz (PA/EA)
- 2 Gatzarria (PA/EA)
- 3 Brassempouy (PA/EA)
- 4 Les Abeilles (PA)
- 5 Le Piage (PA/EA)
- 6 Arbreda (PA)
- 7 Esquicho Grapaou and La Laouza (PA)
- 8 Arcy-sur-Cure (PA)
- 9 Mochi (PA)
- 10 Fumane (PA)
- 11 Geissenklösterle (EA)
- 12 Willendorf (EA?)
- 13 Krems-Hundssteig (PA/EA?)
- 14 Istállóskő (EA)
- 15 Tincova (PA)
- 16 Kozarnika (PA)
- 17 Temnata (IUP)
- 18 Bacho Kiro (IUP)

Figure 3.: Location of the European sites discussed in the text.  
 PA: Protoaurignacian; EA: Early Aurignacian;  
 PA/EA: stratigraphic succession of Protoaurignacian/Early Aurignacian;  
 IUP: Initial Upper Paleolithic

has also been defined in the cave of Kozarnika in northwest Bulgaria (level VII, Tsanova 2006), where it is dated to between 39,000 and 36,000 BP (Guadelli et al. 2005), and at the open-air site of Tincova in Romania (Teyssandier 2007; Zilhão 2006). Finally, following a redefinition of industries in western Europe, several authors extend their comparisons to the Near East, emphasizing similarities between some layers of the Early Ahmarian and the Protoaurignacian (Bar-Yosef 2003, 2006; Bon 2006a; Mellars 2006; Teyssandier 2006, 2007; Zilhão 2006). Such similarities also seem to exist with the Baradostian in the Zagros region (e.g., Jaubert et al. 2005; Olszewski 1999; Olszewski and Dibble 1994; Otte et al. 2007; Solecki 1958).

Originally seen as a geographically limited phenomenon, these industries with long, rectilinear retouched bladelets are now identified as the first technological aspect of the Upper Paleolithic, and at a scale extending beyond European boundaries. This phenomenon thus provides incontestable proof of the success of the technology, which was transmitted across diverse ecosystems. Reciprocally, as the geographic extension of the Protoaurignacian is being enlarged, that of the Early Aurignacian has been reduced to the specific regions of Aquitaine, Pyrenees, Cantabria, and the Swabian Jura. Elsewhere, evidence of the Early Aurignacian remains sparse and equivocal, often limited to split-based points in the absence of substantial lithic assemblages, such as in central Europe (Teyssandier 2007).

It thus appears that between 37,000 and 35,000 bp (in uncalibrated  $^{14}\text{C}$  chronology), a wave of diffusion swept across Europe, corresponding to the development of a technical system based in particular on the production of long bladelets used as projectile points (e.g., Bon 2005, 2006b; Broglio et al. 2005; O'Farrell 2005). Moreover, all available evidence indicates that this cultural current preceded the appearance of the "classic" Aurignacian around 34,000 BP and centered in the western half of Europe.

#### **PERSONAL ORNAMENTS AND GRAPHIC REPRESENTATIONS IN THE AURIGNACIAN EVOLUTIONARY SEQUENCE**

Do all the innovations generally attributed to the Upper Paleolithic appear suddenly at the beginning of the Protoaurignacian as is commonly asserted in the literature? For us, the answer to the question appears to be negative. The Protoaurignacian differs quite clearly from the Early Aurignacian in the realms of lithic and osseous technology, and the differences are even more pronounced in other domains, particularly symbolic and artistic ones.

It has long been known that the majority of Protoaurignacian sites in the western Mediterranean region contain numerous personal ornaments, most often in the form of pierced shells (e.g., Bartolomei et al. 1994; Bazile and Sicard 1999; Kuhn and Stiner 1998; Taborin 1993; Vanhaeren 2002; Vanhaeren and d'Errico 2006). This constitutes a notable change from earlier in the Paleolithic since even though shell ornaments antedate the Protoaurignacian, their numbers before this time remain sparse and uneven (e.g., d'Errico et al. 1998; Zilhão 2007). Still, most Protoaurignacian assemblages have few personal ornaments in comparison with those known from Early Aurignacian assemblages. Not until the Early

Aurignacian do personal ornaments become more diverse in both form and raw materials, sometimes involving multistage production processes. In addition to shells and animal teeth (sometimes human teeth, in the Early Aurignacian; Henry-Gambier et al. 2004a), ivory and stone ornaments become much more common (Taborin 2004; Vanhaeren 2002; White 2002). Even though the proximity of the Protoaurignacian sites to the Mediterranean coast must be considered (Teyssandier 2003, 2007), the initial Upper Paleolithic still appears to be characterized by less diversity in personal ornaments.

Another characteristic that is generally associated with the appearance of the Aurignacian is the presence of figurative portable art, the most impressive examples being the famous ivory statuettes from the Swabian Jura (e.g., Conard 2003; Hahn 1972, 1986). While definitely Aurignacian, these figurines are not present at the beginning of the Swabian Upper Paleolithic sequences; rather they appear around 32,000–31,000 bp, and thus 3,000 years (in uncalibrated  $^{14}\text{C}$  chronology) after the development of the Early Aurignacian in the region (see Conard and Bolus 2003; Teyssandier 2003, 2007; Teyssandier et al. 2006; Verpoorte 2005; Zilhão 2007; Zilhão and d'Errico 1999, 2003a, 2003b). When placed in the context of the Aurignacian, their thematic and stylistic similarities to the paintings in Chauvet Cave become even more significant (Clottes et al. 1995; Tosello and Fritz 2005), especially given that their assigned ages overlap (Teyssandier 2007; Valladas et al. 2005; Zilhão 2007). The data presented by J. Zilhão (2007) follow this view, attesting to the full development of graphic manifestations only during the more recent phase of the Aurignacian (Lorblanchet 2006; Teyssandier 2007), at the moment when the territorial expansion of this techno-complex was at its greatest in both northern and eastern Europe.

These data indicate that the elements identified as constituting the Aurignacian appeared progressively and gradually, rather than simultaneously and abruptly.

### ARRHYTHMIA AND PARALLEL EVOLUTION

At this point, our distinction between the Protoaurignacian and Early Aurignacian is based on differences in their lithic industries. We propose that the search for technical solutions for the arming of projectile weapons was one of the driving forces behind the technological evolution of the initial Upper Paleolithic (Bon 2005, 2006b; Teyssandier 2007). As early as the Protoaurignacian, and more broadly throughout the Upper Paleolithic, bladelets were significant in this context. In addition, the place of bladelets in the Protoaurignacian technical system was not the same as it was in the Early Aurignacian. The former were made using a continuous reduction sequence that produced both blades and bladelets (without precluding the production of bladelets independent of blades), whereas the latter were made exclusively by reducing carinated cores. This operational distinction is also associated with clear morphological differences in the desired bladelet forms. The phenomenon continues in the Recent Aurignacian with the famous twisted bladelets of this period (Dufour bladelets of the Roc-de-Combe subtype). We thus hypothesize an evolution in the production of stone projectile elements during which the blade and bladelet spheres became progressively distinct, and

manufacture of domestic versus hunting tools was increasingly differentiated (Tartar et al. 2006; Teyssandier 2008).

A similar gradual evolution could also characterize the emergence of systematized bone tool productions (Teyssandier 2007, 2008). Osseous industries do not appear to become generalized and attain a certain degree of organizational complexity until the Early Aurignacian. Raw materials are managed differently based on the intended function of the tools (Liolios 1999, 2006; Tartar et al. 2006), again reflecting the division between domestic and hunting tools. Skeletal bones were used to make domestic tools (awls and smoothers, for example), and reindeer antler was used for hunting tools (points with split bases and then full-based points). Ivory, with a few exceptions, was reserved for the fabrication of ornamental objects and statuettes. This differentiated use of osseous materials is particularly evident in the Aurignacian split-based points in the archaeological horizon (AH) II at Geissenklösterle (Liolios 1999; Teyssandier and Liolios 2003), dated to approximately 32,000 BP (Teyssandier 2003, 2007; Teyssandier et al. 2006; Verpoorte 2005; Zilhão and d'Errico 2003a, 2003b).

Unfortunately, the osseous industries of the Protoaurignacian are less well documented than those of the Early Aurignacian. Scholars showed a lack of interest in these industries relative to lithic assemblages during the 1980s and 1990s, perhaps because of their poorer and less diverse nature (Liolios 2006). Furthermore, the presumed exclusively Mediterranean origin of the Protoaurignacian partially justified this lack of attention since throughout the Upper Paleolithic, osseous industries are generally less rich in the Mediterranean than they are in continental and Atlantic Europe. For example, in her study of the assemblage from Level K at Le Piage, now attributed to the Protoaurignacian (Bordes 2002, 2003), L. Mons (1981) documented several types of points and awls. She also reported a total absence of split-based points but the presence of several point fragments with a circular cross-section, a trait recently confirmed by technological analyses (Bordes et al. 2008). These tools could be characteristic of initial Upper Paleolithic industries since points or rods with a circular cross-section, often ivory, are also known from other assemblages attributed to the Protoaurignacian (e.g., Gatzarria, Les Abeilles, level VII of the Grotte du Renne at Arcy-sur-Cure). Moreover, in AH III of Geissenklösterle, which contains a typical Early Aurignacian lithic industry, split-based points are curiously absent, whereas two ivory points with circular cross-sections have been documented (Hahn 1988; Liolios 1999). Could this be a distinctive characteristic of osseous production at the beginning of the European Upper Paleolithic (Teyssandier 2007)? Whether or not future studies bear this out, the osseous assemblages do seem to become richer and to undergo transformations in the course of the Aurignacian sequence.

### **THE PALEOANTHROPOLOGICAL QUESTION: ONE OR SEVERAL AUTHORS?**

When H. Breuil (1913) defined the Aurignacian and assigned it to a specific position in the evolution of the Upper Paleolithic, he left no doubt as to the author of all the innovations that characterize the first phases of the Upper Paleolithic.

For him, the Aurignacian was an exogenous phenomenon introduced by a new human type:

It does not seem possible that the Upper Paleolithic could anywhere, in the regions indicated [Atlantic and Mediterranean Europe], derive from the Mousterian. It is more likely the result of invasions by peoples much more elevated in the scale of races and civilizations than their Neandertal predecessors (Breuil 1913:174).<sup>1</sup>

We now know that the first phases that H. Breuil considered Aurignacian, now known as the Châtelperronian, were the work of Neandertals. First suspected by Leroi-Gourhan (1958) based on dental remains found in the Châtelperronian levels of Arcy-sur-Cure, this attribution has since been corroborated by discoveries at Saint-Césaire (Levêque and Vandermeersch 1980) and additional analyses of the Arcy-sur-Cure remains (Bailey and Hublin 2006; Hublin et al. 1996). Currently, however, very few researchers question the association between the Aurignacian *sensu stricto* and anatomically modern humans.<sup>2</sup>

All available evidence indicates the definite association between anatomically modern humans and the more recent phases of the Aurignacian at sites such as Les Rois (France) and Mladeč (Czech Republic; e.g., Henry-Gambier 2005; Trinkaus 2007; Wild et al. 2005). The situation is much less clear, however, for the early phases of the Aurignacian. No human remains have yet been found in the Protoaurignacian, with the possible exception of fragmentary remains yielded by level K of Le Piage and currently under study. The record is nearly as sparse for the Early Aurignacian since very few sites from this period have yielded human remains, and those that have been found consist mostly of teeth whose taxonomic identification is strongly debated (e.g., Henry-Gambier et al. 2004a vs. Bailey and Hublin 2005). Furthermore, recent analyses of several anatomically modern human specimens presumed to be contemporary or even associated with the Aurignacian have somewhat or considerably reduced their attributed age (e.g., Cro-Magnon: Henri-Gambier 2002; La Rochette: Orschiedt 2002; Hahnöfersand and Kelsterbach: Street et al. 2006; Vogelherd: Conard et al. 2004). In the end, following the discoveries at Pestera cu Oase in Romania (Trinkaus 2007; Trinkaus et al. 2003a, 2003b), even if we can affirm that an anatomically modern human type was present in central Europe around 35,000 BP, we know nothing about its technical and cultural practices. The debate concerning the phylogenetic position of the first *Homo sapiens sapiens* in Europe is further complicated by the dual positions expressed by paleoanthropologists. For some, the Neandertal/modern human “boundary” is clear and unequivocal (e.g., Harvati et al. 2007), while others argue for a substantial degree of hybridization between the first modern humans in Europe and the indigenous Neandertal populations (Trinkaus 2007).

## CONCLUSIONS

Our perception of the emergence of the Upper Paleolithic is currently changing, and the vision of simultaneous and abrupt innovations, associated with a

homogeneous and conquering culture, is being replaced by a more complex image. The evidence for a gradual emergence of the traits that constitute “full” behavioral modernity transforms our understanding of the development of the Aurignacian and the Upper Paleolithic in general. The challenge is great because we must consider a multitude of variables (technical evolution, economic and social changes, the role of demography and environmental conditions, etc.) in order to understand this process. This approach is necessary in order to formulate new interpretative models of the origin and development of the Upper Paleolithic that are in accordance with the archaeological data.

How can we reconcile our perspective on the origins of the Aurignacian as being cultural with the timing, as currently understood, of the arrival of anatomically modern humans in Europe? The technical comparisons already made between Protoaurignacian and Early Ahmarian industries and the discovery of analogous assemblages geographically intermediate between the Near East and Europe (e.g., Üçağizli in Anatolia: Kuhn et al. 1999, 2001) have led some researchers to see these innovations as the result of human migration, thus moving back the timing of the first wave of modern human diffusion in Europe (e.g., Bar-Yosef 2006). Such a conclusion is premature given that similar innovations in lithic tool production seem to develop in different regions in continuity with local, preexisting populations. We need to identify the social processes that would account for this apparent similarity.

In addition to reflecting a gradual emergence of the constituent elements of the Aurignacian, it also appears that these traits were not the result of a full “revolution” but more a concretization of ideas, some of which were already expressed in earlier cultural complexes. In lithic tool production, for example, one of the driving forces of change at the dawn of the Upper Paleolithic could have been the role played by projectile weapons. In the initial Upper Paleolithic, whether the Early Ahmarian in the Near East or the Protoaurignacian in Europe, this functional purpose would become a key element in the organization of the lithic industries and their orientation toward the production of long, rectilinear bladelets. This phenomenon of microlithization is not totally unprecedented in the evolutionary trajectory of lithic technology and could be rooted in the vast cultural mosaic that characterizes the so-called Middle to Upper Paleolithic “transitional” industries. Some of these industries are strongly oriented toward the production of blades, and especially points, through reduction sequences with roots in the Levallois method. This is the case, for example, in the Emirian in the Near East (Bar-Yosef 2000), the Bachokirian in Bulgaria (Teyssandier 2006, 2007; Tsanova 2006), the Bohunician in Moravia (Škrdl 2003), and the Neronian in the Rhone Valley of France (Slimak 2004). In all of these industries, points predominate, and they could have been used to arm thrusting spears (Shea 2006), which would confirm the discovery of a Levallois point embedded in the vertebra of a wild ass at Umm el Tlel in Syria (Boëda et al. 1999), as well as certain traces observed on the points from level 11 at Bacho Kiro (Teyssandier 2007; Tsanova 2006). In approximately the same chronological context, similar technical tendencies are evident in the production of lithic points in the Châtelperronian of southwestern France (Pelegrin 1995) or the Lincombian-Ranisian-Jzermanovician complexes of

northwestern Europe (Flas 2008). Therefore, a common concern and the diffusion of a new idea, in this case the search for technical solutions for arming weapons, could explain the apparent commonality of different industrial complexes at the boundary of the Middle to Upper Paleolithic. Only a few thousand years later, this tendency would become concrete and lead to a relatively homogeneous technical tradition, which was linked to the great success of bladelet production, not only from a technofunctional perspective but also from a socioeconomic one in relation to the mobility of these hunter-gatherer groups (Bon 2005).

Therefore, though the emergence of modern humans appears to reflect a conquest by the Aurignacian culture, the most accurate picture is perhaps not one of a migrating people braving rivers and mountains in search of new territories, but rather one of societies linked to one another through the development of new socioeconomic relations and, consequently, an acceleration of cultural intermixing and, incidentally, genetic intermixing as well. A supposed demographic increase (e.g., Shennan 2001; Zilhão 2006) and probable contact with indigenous Neandertal populations would have led to a reformulation of intergroup relations and, consequently, contributed to the development and diversification of personal ornaments, followed in the second half of the Aurignacian (ca. 32,000–31,000 BP; Teyssandier 2007; Zilhão 2006, 2007) by the emergence of portable and parietal graphic representations. These socioeconomic phenomena could have either accompanied the arrival of new populations or generated the acceleration of the biological processes and diffusion of modern traits. Research into the long-term processes occurring at the boundary of the Middle and the Upper Paleolithic will enable us to develop new scenarios that depart from that of the strict replacement of populations, and that will be in greater accordance with the archaeological and paleoanthropological data.

## NOTES

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1. Il ne semble pas qu'on puisse admettre que le Paléolithique supérieur soit nulle part, dans les régions indiquées, dérivé du Moustérien. Il s'agit plus vraisemblablement d'invasions de peuples beaucoup plus élevés dans l'échelle des races et dans celle de la civilisation que leurs prédécesseurs néandertaliens (Breuil 1913:174).

2. This association has been questioned based on the discovery of a possible association between Aurignacian tools and Neandertal remains at Vindija (Croatia) and Bacho Kiro (Bulgaria) (e.g., Wolpoff 1996). However, in neither case do the data support the hypothesis of an association between Neandertals and the Aurignacian. At Bacho Kiro, the mandible fragment of a young child cannot be attributed to a particular human type. Furthermore, the cultural context of the Bachokirian and the question of its phylogenetic relation with the Aurignacian have recently been reviewed (Rigaud and Lucas 2006; Teyssandier 2007; Tsanova 2006). These new analyses show that the Bachokirian is part of the vast mosaic of so-called Middle to Upper Paleolithic "transitional" industries, within which we observe an

elongation of lithic tools and a clear tendency to produce blanks with convergent edges, or points. At Vindija the nature of the assemblage itself and the association of Szeletian type tools with Aurignacian bone points are problematic (Zilhão 2009).

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