Reflections on the role of bone tools in the definition of the Early Aurignacian

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ABSTRACT Certain particularities of the known corpus of split-based points, hitherto often considered as an index fossil of the classical Aurignacian and as forming a relatively homogeneous ensemble, are discussed. Differences were found in relation to the design of the intended point at La Quina, Castanet, Geißenklösterle, Tuto de Camalhot, and Isturitz. These differences may coexist, however, with a similar product economy, as when Isturitz is compared with Tuto de Camalhot, suggesting that some form of technical differentiation existed among Early Aurignacian groups. A fundamental type of divergence may also have to do simply with the existence of Early Aurignacian groups with no production of bone tools (or with very little of it), as seems to be the case in Spain.

The composition of Aurignacian bone tool assemblages has often determined the cultural attribution of archeological levels (Sonneville-Bordes, 1960; Hahn, 1977), the Early Aurignacian becoming typical simply as a result of the presence of split-based points, even when these were in very limited numbers and one could not assess whether they were produced on-site because of the lack of evidence concerning the technological processes involved

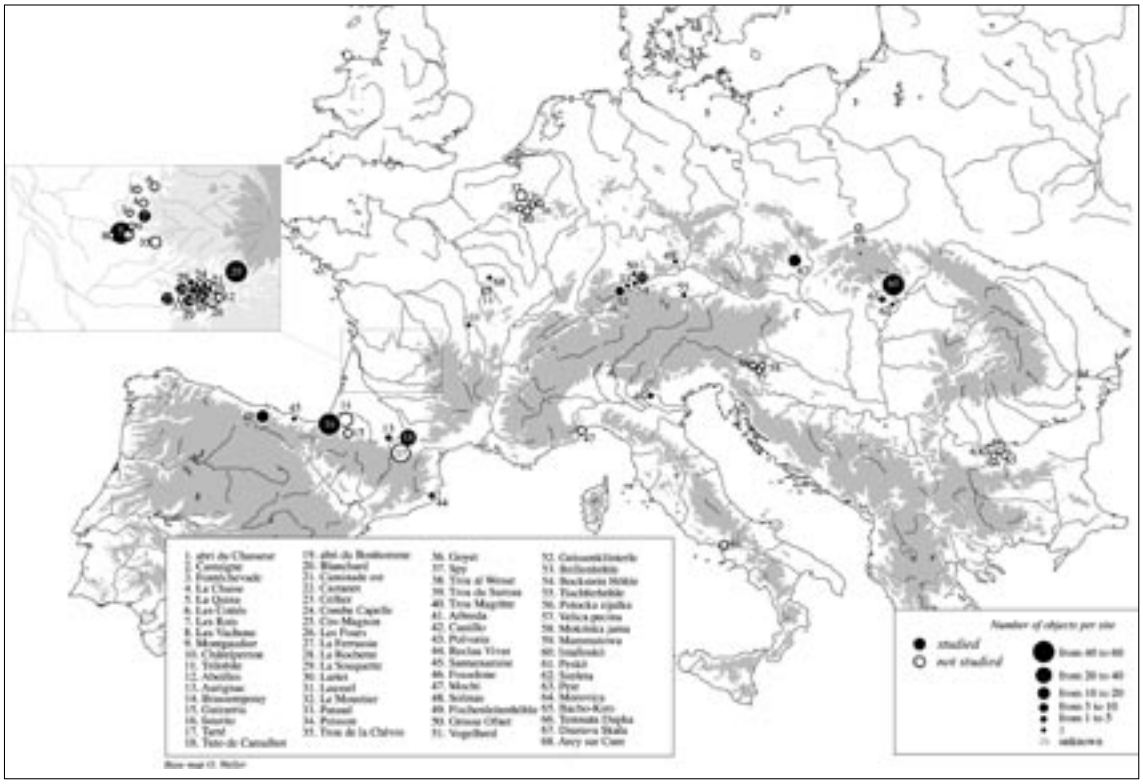

FIG. 1 – Sites of the Early Aurignacian with split-based points.

(Fig. 1). Moreover, the use of bone tool data has often been partial at best (only the points are dealt with), and typological. The identification of these analytical biases led us to an investigation of the intrinsic characteristics of the corpus, and of the potential meanings of such characteristics in assemblages from the Aurignacian.

Several aspects are successively dealt with: 1) the quantitative representativity of split-based points in assemblages at a wider European scale; 2) the actual diversity of technical designs that may exist among split-based points in spite of them being considered as a single type; 3) one instance (the Spanish Aurignacian) of a marginal development of bone tools that, in combination with the low numbers of points, suggests that some Early Aurignacian groups may have been altogether lacking in bone tool production; 4) questions raised by the pattern of observed diversity, which does not strictly coincide with that observed in the realm of lithics (actually, it would be striking if things were otherwise, as any ethnologist would point out).

The geographical and quantitative distribution of split-based points

Even if their antiquity is not under question, outside certain geographical zones (i.e., southwest France), the role of split-based points as index fossils must come under scrutiny. It suffices in fact to consider the density distribution of the Early Aurignacian corpus of split-based points to verify an extreme concentration in southwest France and in the upper Danube valley, as well as a sporadic presence in certain zones such as northern Spain or the Balkans (Fig. 1) (Albrecht et al., 1972; Hahn, 1977; Bernaldo de Quirós, 1981, 1982; Soler and Maroto, 1993). For a grand total of no more than some 500 items, three quarters of the finds, in fact, come from the Aquitaine basin (Liolios, 1999). A priori, two not contradictory hypotheses come to mind as possible explanations for this spatial and quantitative pattern.

The first hypothesis is that of differential preservation, which would allow continued consideration of the existence outside of southwest France and the Swabian Jura of a typical Early Aurignacian to which would belong also the Hungarian, Belgian or Croatian assemblages with split-based points, regardless of whether they are made up of one, two or ten specimens. Differential preservation alone, however, does not seem capable of explaining the absence of points and bone tools from certain areas, such as Italy (Broglio, 1993, 1996; Gambassini, 1993), or southeast France, or the low figures characterizing the Spanish assemblages (Bernaldo de Quirós, 1982), especially since, in all cases, these areas are close to the groups producing most intensively.

Some of these assemblages poor in bone tools are now interpreted as Proto-Aurignacian (Bon, 2002); and the hypothesis has also been put forward that a penecontemporaneous material culture existed which would have differed from the Early Aurignacian in its lack of investment in bone working techniques (Teyssandier, 2003); the affinities of such a material culture with the Aurignacian are in any case currently under scrutiny (Teyssandier, 2003). Unfortunately, however, the evidence is not easily amenable to quantitative treatment, because the excavations are old, and the corpuses truncated. As a result, quantitative assessment of the correlative frequencies of stone tools, faunal remains, waste from bone debitage, and points, is not possible (Liolios, 1999). Whatever the cultural identity of these assemblages poor in bone tools, their interpretation poses problems, and nothing is there to suggest that those tools were indeed manufactured by the occupants of the sites.

It is also possible to advance a diffusionist hypothesis according to which bone working emerges and spreads from east to west, following the Danubian axis, and then comes down to the Aquitainian and Pyrenean zones, as in classical migrationist models (Djindjian, 1993;

Kozłowski, 2000). Such a progression would have accompanied the equivalent east-west development of the Early Aurignacian (sensu stricto). However, no gradual quantitative increase of bone tools exists in east and central European corpuses. In simple terms, a clear quantitative imbalance exists between east and west, and in fact prevails throughout the entire duration of the Aurignacian (Bernaldo de Quirós, 1982; Hahn, 1977; Knecht, 1991). Moreover, most eastern European corpuses contain only isolated specimens, some of which recovered in rather problematic archeological contexts (cf., for instance, Zotz, 1964-1965; Hahn, 1977; Otte, 1979). It is often on the basis of a single specimen that certain sites were attributed to the Early Aurignacian, and when the corpuses are larger, they either come from disturbed contexts (Dzeráva skala — Prosek, 1953), or are so isolated that interpretation becomes almost impossible (Istallóskö, Peskö — Vertès, 1955, 1956).

If not associated to a lithic assemblage context, such isolated point finds are of little demonstration value at the cultural level, especially when one duly considers how such relatively valuable objects circulate in contemporary hunter-gatherer societies. At best, the index fossils may provide an indication of the age of the deposits, or of contemporaneity with more diagnostic assemblages, but their presence in small numbers at a given site or level otherwise bears little cultural meaning. This is all the more so if one adds three other observations that give witness to the specificity of these tools: the diversity of split-based point designs; the diversity in design in spite of a similar organization of production; the local resistance to the adoption of bone working techniques.

The diversity in the technical design of split-based points

Where the debitage of point blanks is concerned, similar methods are always used (Knecht, 1991; Liolios, 1999). All split-based points are on antler (with perhaps a single exception at El Castillo, in Spain, cf. *infra*). Blanks are extracted by cleaving or fracturation and then split again, through indirect percussion, into three or four baguettes (Figs. 2h-2i). The standardization of blanks is generally much reduced. In such a context of little predetermination, shaping becomes of paramount importance in giving the objects their morphological and functional characteristics. It is at the level of this shaping stage that differences exist in the *chaînes opératoires* of the assemblages discussed here: Geißenklösterle (Hahn, 1988), La Quina (Henri-Martin, 1931), Castanet (Peyrony, 1935), Isturitz (Passemard, 1944), and Tuto de Camalhot (Vézian and Vézian, 1966).

To compare these corpuses, we have reconstituted the reduction and resharpening sequences of these objects, in order to arrive at the "initial (intended) point", upon which all comparisons are made (Liolios, 1999). Without such a reconstitution, the corpuses can only be described on the basis of typology; in fact, the successive resharpening and reshaping episodes underwent by these points explain the marked heterogeneity of the corpuses, further compounded by the "noise" introduced from the beginning by the initial morphology of the reindeer antler, exploited by Aurignacian groups in very flexible ways. Shaping sequences do not vary, and feature three phases: roughing-out, fabrication of the split-base, object finishing. What varies are the techniques used, the procedures to obtain the slit and the intended traits of the point.

The corpus from Geißenklösterle (Fig. 3) includes 26 points or point elements; only five are complete pieces. The intended product has a sub-rectangular cross section and is obtained by scraping and partially shaped; only the internal surface and the edges are scraped, the spongiosa being systematically removed. The preparation of the basal slit is effected through lateral incisions (one on each side of the piece, parallel to the axis), which serve as guides for

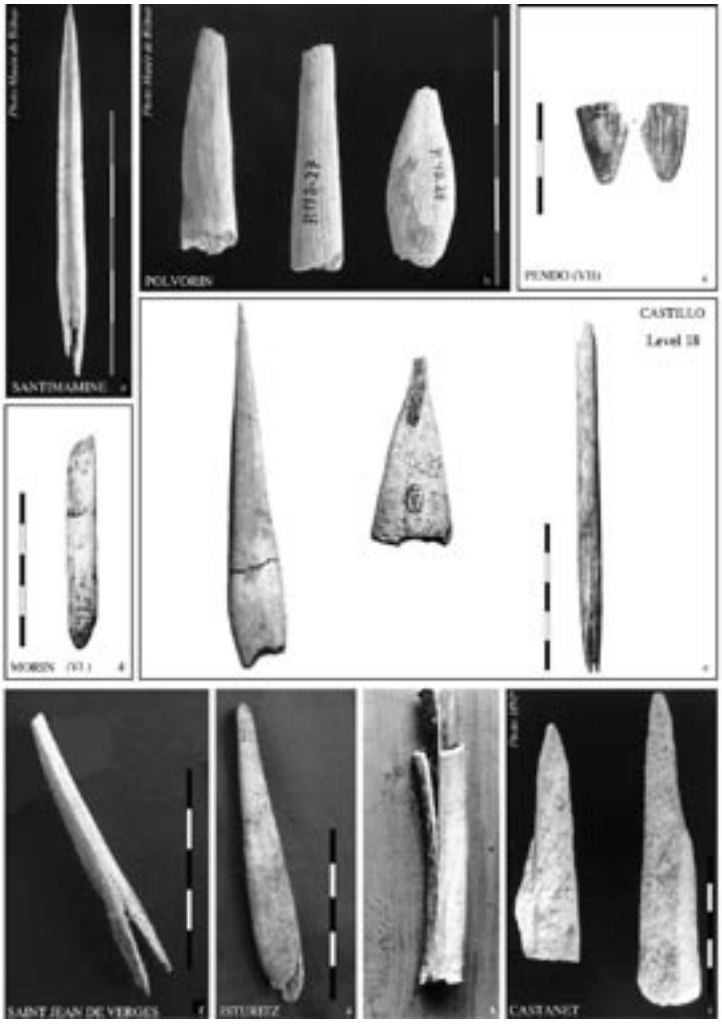

FIG. 2 – a. split-based point from Santimamiñe; b. mesio-distal fragments and complete split-based point from Polvorín; c. lip of a split-based point from Pendo (level VII); d. ivory point fragment from Morin (level VI); e. split-based points in deer antler and ivory from Castillo; f. sub-rectangular split-based point from Tuto de Camalhot; g. elliptic split-based point from Isturitz; h. cleaved section of reindeer antler (experimental); i. unmodified reindeer antler baguettes from Castanet.

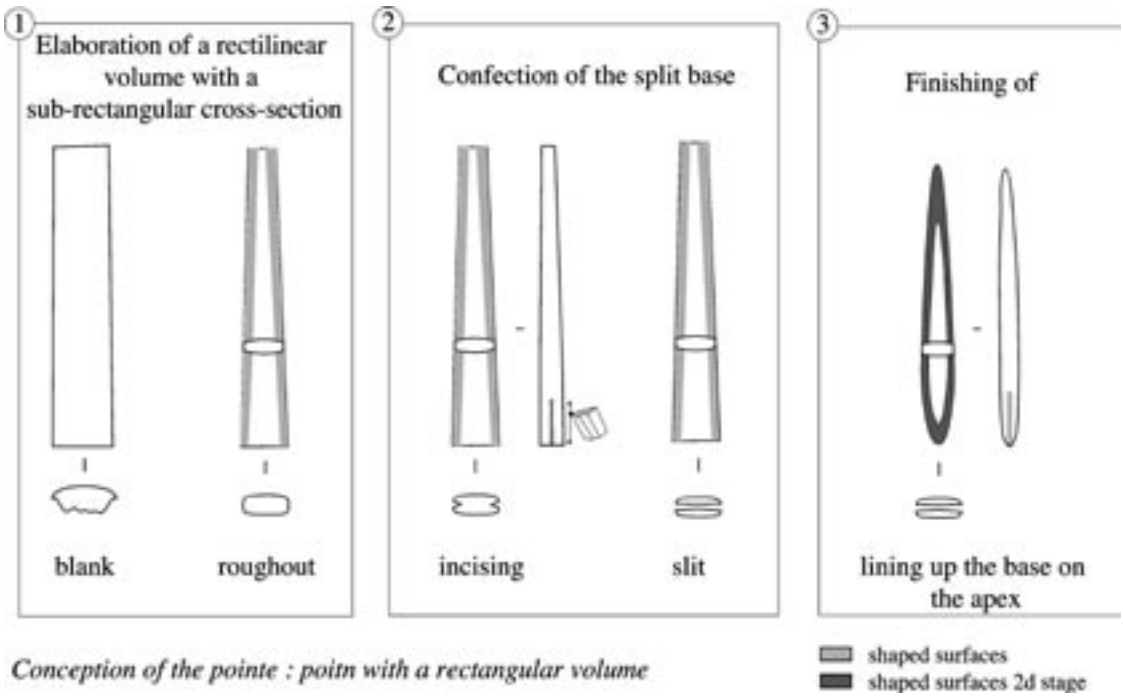

FIG. 3 – Shaping of a split-based point at Geißenklösterle.

the slit (for technical reasons relating to the size of the blank); no particular attention is given to the surface of the latter. The point, and especially the tip, is then finished.

The corpus from La Quina (Fig. 4) at the Musée des Antiquités Nationales at St. Germain-en-Laye contains nine complete points, nine points abandoned while undergoing reshaping, and 22 point fragments. The intended point has a biconvex cross section and is preformed by abrasion, beginning with the internal surface of the blank, in order to remove most of spongiosa and regularize the lateral breaks; work then continues towards the external sides and, finally, extends into the proximal zone. The external medial surface remains unmodified. The base of the preform is then split, after preparation by transversal sawing, which eliminates bone material from the sides, in order to obtain a kind of rectangular, flat "striking platform". The piece can then be finished, through abrasion.

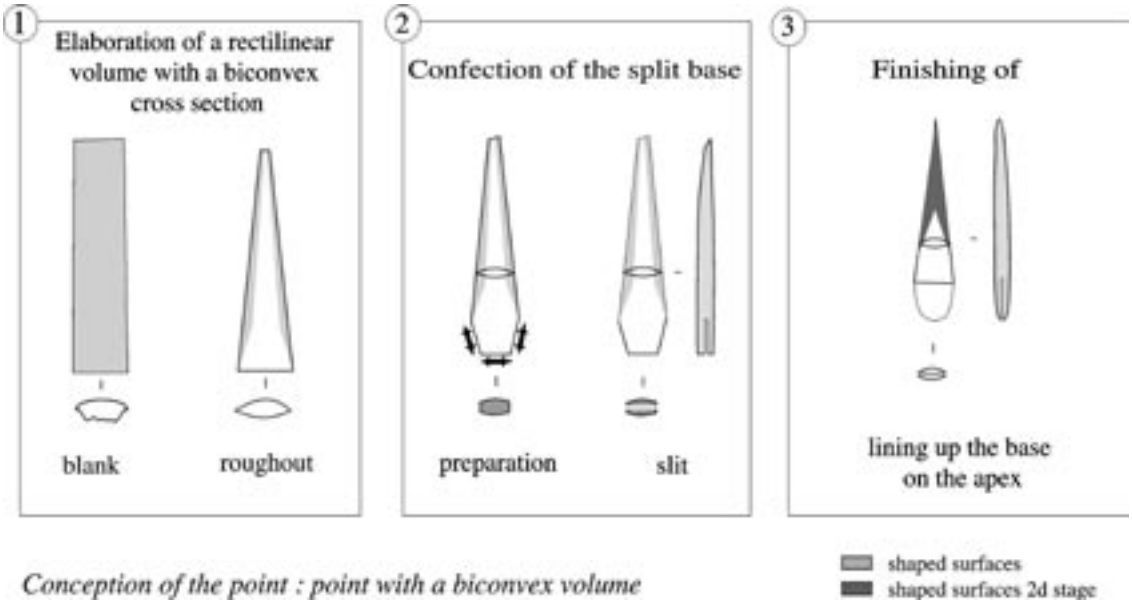

FIG. 4 – Shaping of a split-based point at La Quina.

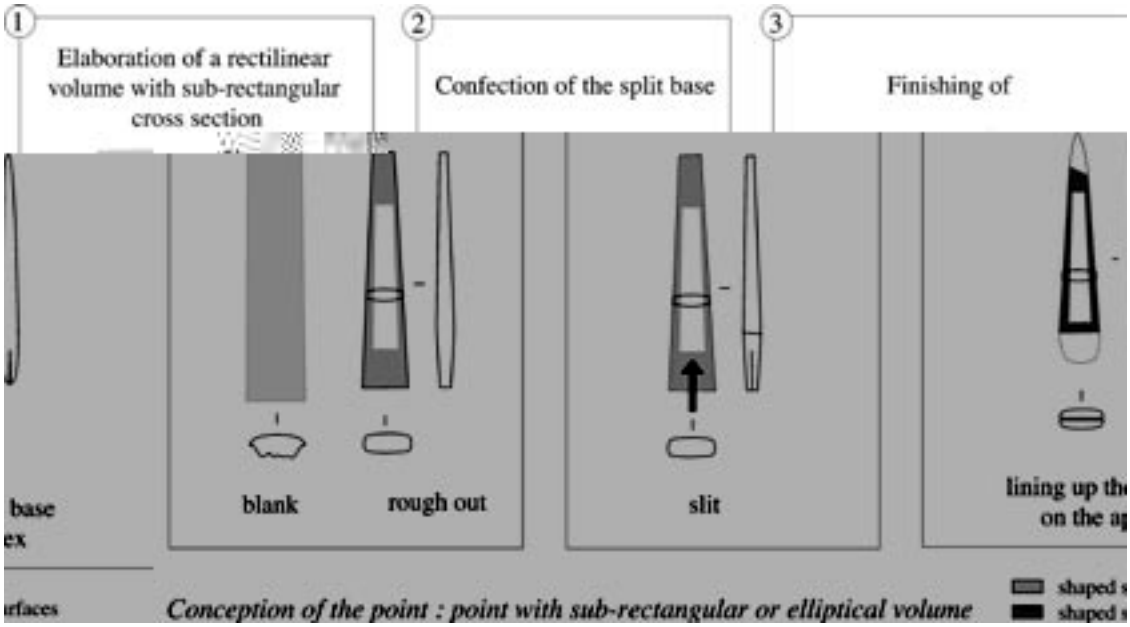

FIG. 5 – Shaping of a split-based point at Castanet.

At Castanet (Fig. 5), the corpus comprises 24 complete points and 40 fragments. The degree of standardization of the Castanet points is very low. The initial section varies between elliptic and sub-rectangular. It is only partially shaped (by scraping), the external medial part remaining unmodified. The basal slit is executed with no specific preparation. This assemblage is the most heterogeneous and least standardized of all that were analyzed.

At Isturitz (Fig. 6), the corpus comprises 43 objects, of which 14 are complete. The Isturitz point is elliptic in cross section (Fig. 2g). It is worked by scraping and, in contrast with those from the preceding collections, shaped in its entirety. In the single preform, the preparation of the slit involves the removal of two small lateral *languettes*; on each side, a double incision followed by splitting effectively removes a small languette, triangular in cross section, thus creating two grooves which guide the production of the slit. The piece is then finished by scraping.

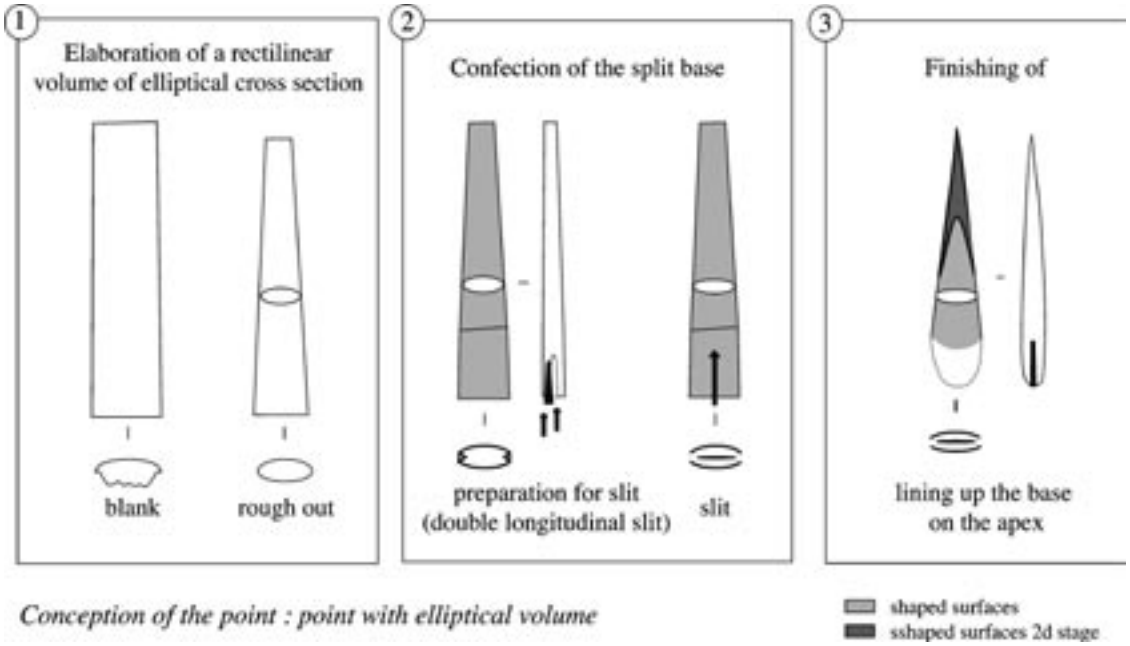

FIG. 6 – Shaping of a split-based point at Isturitz.

At Tuto de Camalhot (Fig. 7), the corpus comprises 39 points and fragments. The blank is scraped on both sides and on the two edges, so that a rectangular cross section is obtained. If need be, the proximal end is then regularized by sawing or reduced by notching, upon which the slit is made with no further preparation. The piece is finished by scraping but, even when retargeted, always preserves a rectangular cross section from base to tip (Fig. 2f).

These objects, typologically similar, are technologically different. They share function, raw-material, *chaîne opératoire* of blank production, and hafting system; but they differ in the underlying concept of what an "efficient point" should look like. It is not so much the techniques (abrasion and scraping), or the diverse methods to split the base, that are most telling. In fact, the scraping of the La Quina pieces can be explained by their exceptional size and the incision of the base in the objects from Geißenklösterle by the narrow blanks. The real difference lies in the volumetric design of the intended point, which varies in the different corpuses between having four (sub-rectangular cross section), two (biconvex cross section) or one surface (elliptic cross section) only.

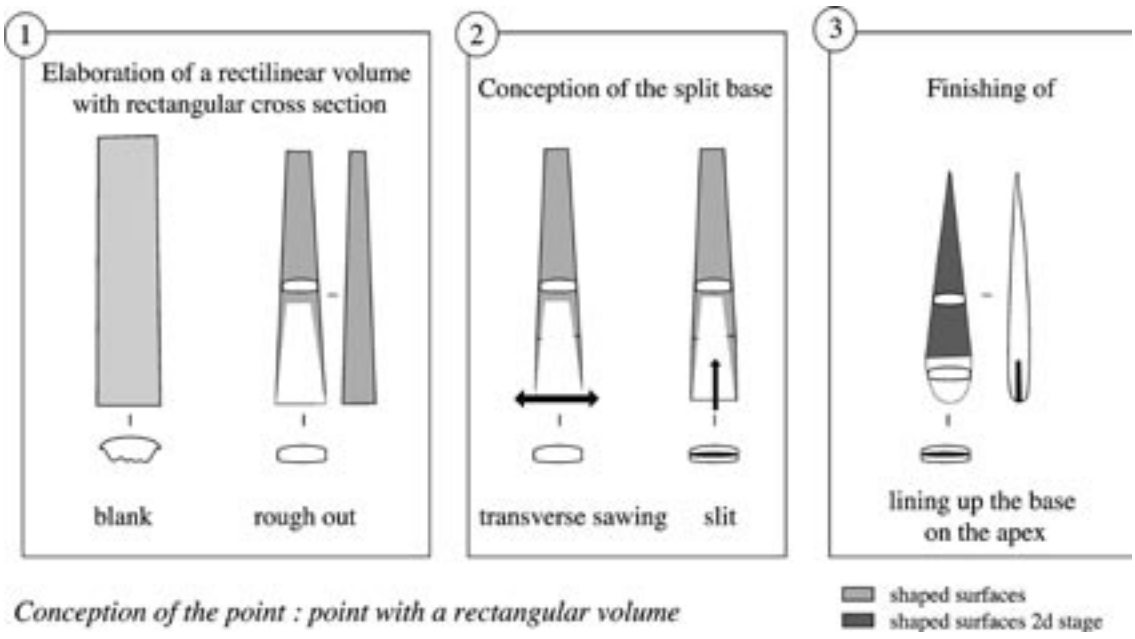

FIG. 7 – Shaping of a split-based point at Tuto de Camalhot.

The technical differentiation of points

Some of these corpuses also exhibit a further specificity. Two given assemblages may be characterized by different point designs and still yield bone tool productions whose economic organization is similar. This is the case with Isturitz (Atlantic Pyrenees) and Tuto de Camalhot (eastern Pyrenees).

The bone tool assemblage from Tuto de Camalhot (Fig. 8) comprises 82 finished objects and is characterized by an important exploitation of antler mainly aimed at the manufacture of split-based points. Raw-material economy is well apparent in that ivory, rare, is exclusively used for ornaments, whereas bone is used for smoothing tools and awls.

Where bone is concerned, the *chaînes opératoires* are relatively simple: blanks are mostly extracted through fracturation and then scraped and, some times, incised. Ivory working is represented only by the last stages of the production system and involves similar techniques of scraping and incision. The antlers of are exploited in their entirety mostly for the production of the split-based points whose manufacturing technique was discussed in the preceding section.

Although caution is in order when considering the collection from Isturitz, because of the history of excavation at the site, it would seem that it features an economy of bone tool production very similar to Tuto de Camalhot (Fig. 9). In level SIII there are 93 finished objects, for the most part split-based points. As at Tuto de Camalhot, ivory is used for ornaments, but also for a few awls, and bone for the manufacture of smoothing tools and awls. Antlers are again exploited in their entirety for the manufacture of points, chisels, and compressors. In spite of the necessary reservations regarding this enumeration, which is clearly not exhaustive, the similarity between the two corpuses remains nonetheless striking.

Where the *chaînes opératoires* are concerned, the methods and techniques used at Isturitz are the same as at Tuto de Camalhot, except for certain awls which, at Isturitz, are not incised. However, the points from Isturitz derive from a different design, and there is also a difference in the intended size of the initial point, those from Isturitz being smaller (Fig. 10). This phenomenon is not due to raw-material, because at both sites the cortical thickness of

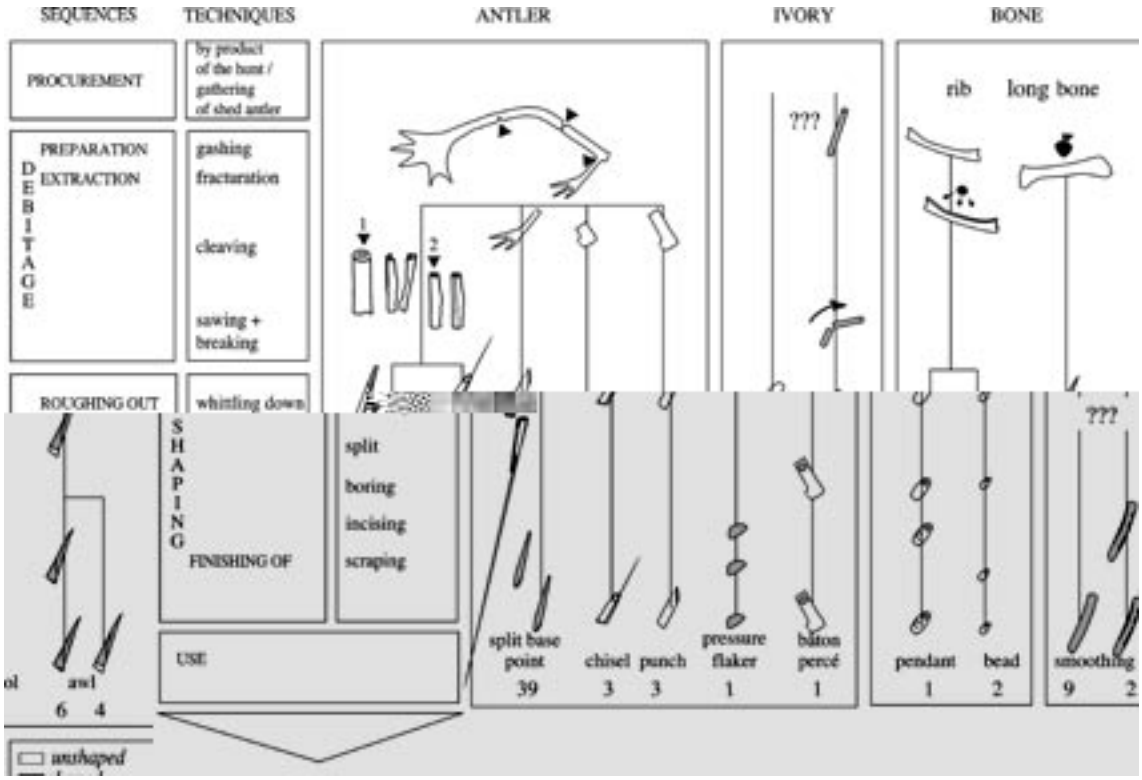

FIG. 8 – *Chaînes opératoires* of osseous raw-materials at Tuto de Camalhot.

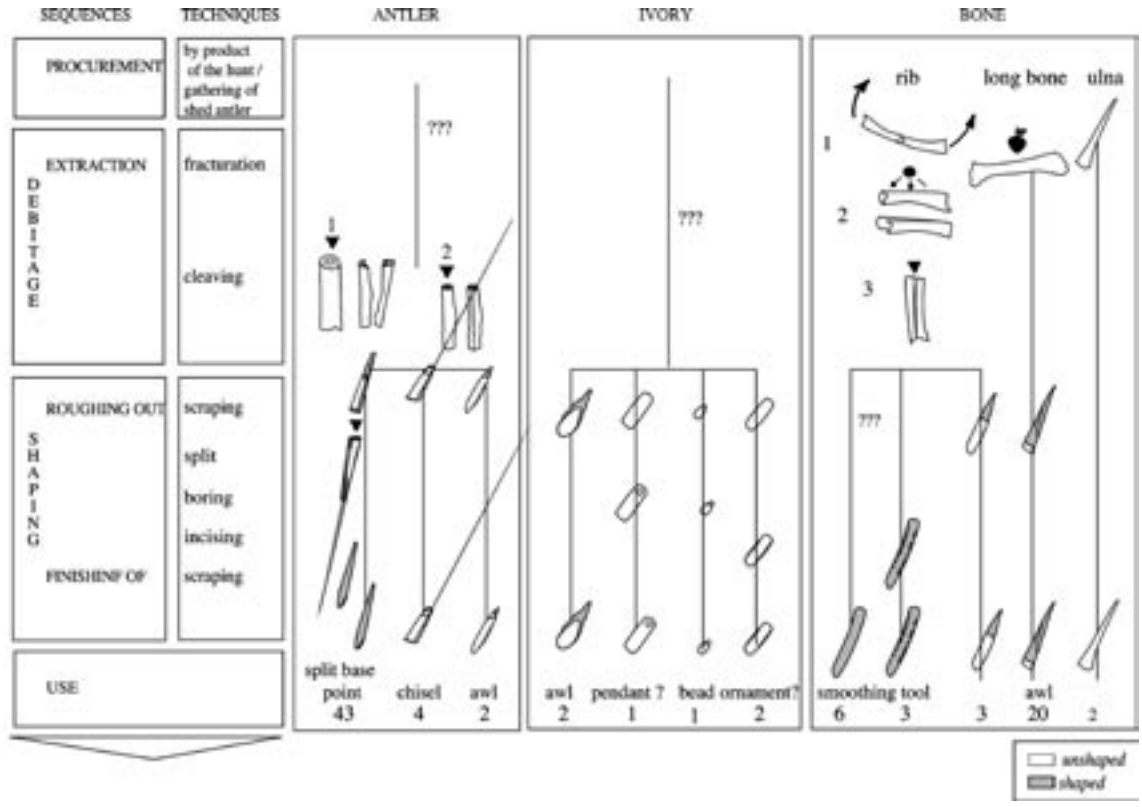

FIG. 9 – *Chaînes opératoires* of osseous raw-materials Isturitz (level SIII).

the blanks used to manufacture the points is identical (Fig. 10). Moreover, the elliptic cross section of the Isturitz points cannot result from the practice of successive reasharpenings, because even the smallest points from Tuto de Camalhot conserve a subrectangular cross section, whereas even the largest from Isturitz are elliptic. These Early Aurignacian productions therefore use the same operational concepts and technical traditions, but differ in the design of the main target of production, the points.

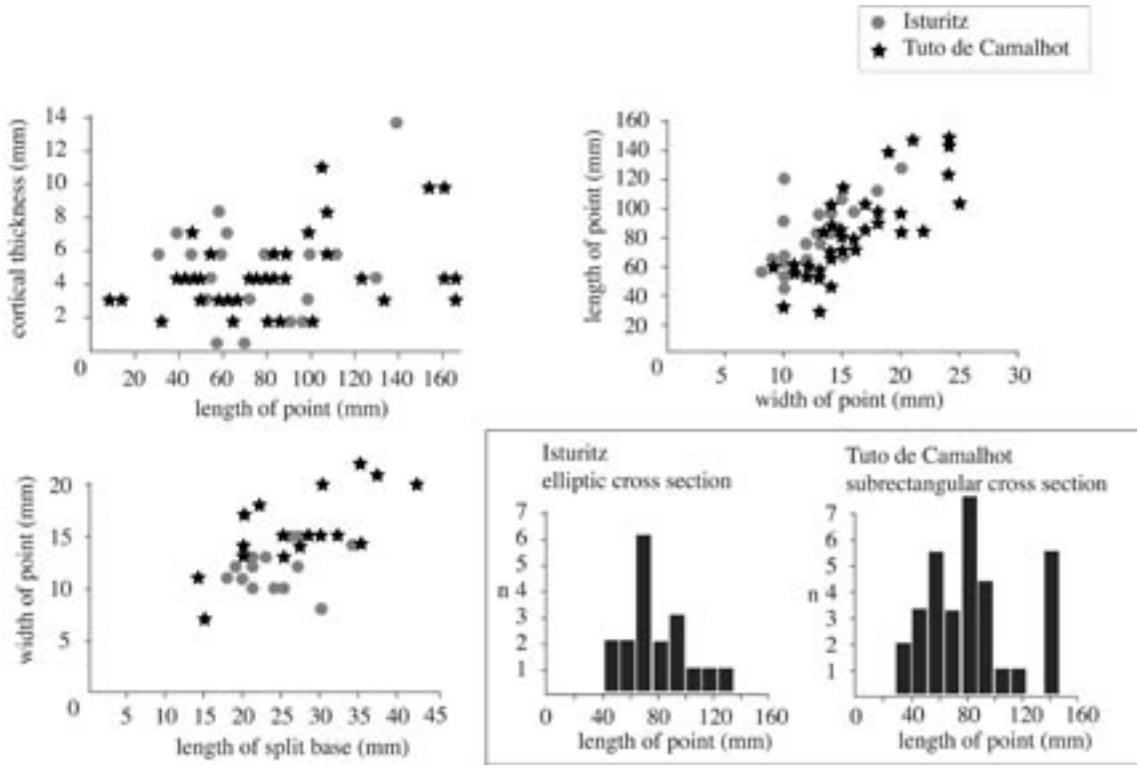

FIG. 10 – Morphometric comparison of the points from Isturitz and Tuto de Camalhot.

The points from the site of Aurignac are too few for comparison, but the two pieces known evoke the corpus from Isturitz. Their comparison with assemblages from the Périgord is currently under way, but the analysis is complicated by the nature of the data; in fact, the corpus of points from the Périgord comes from large sites associated with a plethora of satellite sites where one would not expect to find homogeneous assemblages in the first place (cf., where Castanet is concerned, Liolios, 1999). We have nonetheless compared them with the points from the nearby Spanish sites, in the hope of defining similarities and differences and to better interpret the latter, whose low numbers are so striking.

Bone working in the Early Aurignacian of Spain

The analysis of the Spanish corpuses is complicated by the fact that they are poor and often from old excavations. The sites with Aurignacian bone tools are all in the Cantabrian region (*sensu lato*) (Obermaier, 1925; González Echegaray and Freeman, 1971, 1973; González Echegaray, 1980; Bernaldo de Quirós, 1981, 1982; Cabrera, 1984, 1993; Fortea, 1995) or in Catalonia (Corominas, 1949; Soler, 1986; Soler and Maroto, 1987; Rueda i Torres, 1987) (Fig. 11).

The Catalonian sites of Reclau Viver and l'Abreda are by far the richest (Figs. 11-12), but significantly less so than the French sites. Both yielded points; according to Narcis Soler (paper presented to the Liège 2001 UISPP conference), Reclau Viver yielded eight, and about ten come from l'Arbreda. The latter site also yielded a chisel made on deer antler as well as ivory smoothing tools, a category of finds that, in French sites, is made on animal ribs. Bone has not been worked, and ivory is not exclusively used for ornaments. At Reclau Viver, however, the points are clearly associated with smoothing tools made on ribs.

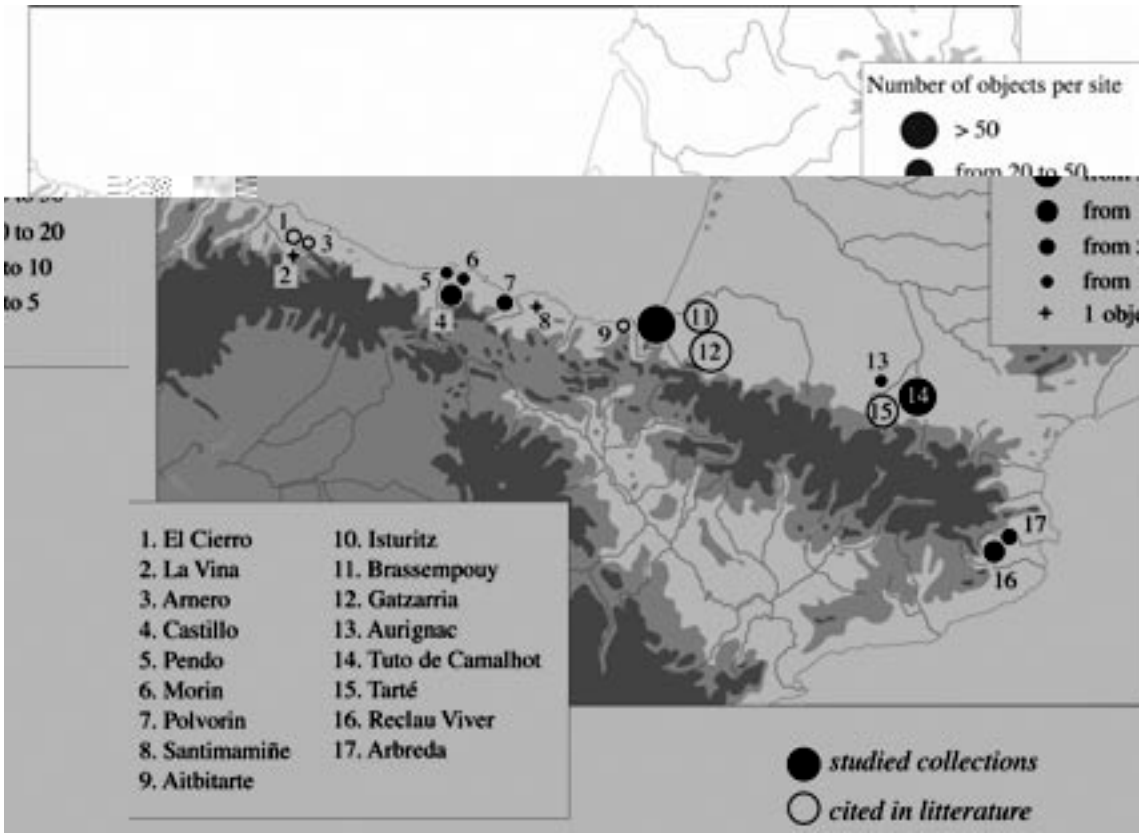

FIG. 11 – Early Aurignacian sites with bone tools in the Pyrenees and northern Iberia.

In the Cantabrian region (Fig. 12), sites are even less rich (Barandiarán, J. M., 1976; Barandiarán, I., 1980; Bernaldo de Quirós, 1982). Split-based points are present in very small numbers, and other features are equally striking: the lack of debitage byproducts, the absence of ornaments and, at El Castillo (level D), the fact that an ivory point is apparently split-based (the single such instance known; a more detailed study of this piece is ongoing). There is also an ivory point fragment in level 6 of Morín (Bernaldo de Quirós, 1982). As in France, there are some smoothing tools made on ribs and chisels made of antler.

All Catalonian points feature an elliptic design; the Cantabrian points, however, are very diverse (Fig. 13). At El Castillo, three different point designs exist: elliptic, biconvex, and cylindrical, but the association of these different points is perhaps simply stratigraphical, not cultural. The single split-based points from Santimamiñe and Polvorín are, respectively, cylindrical and elliptic (cf. also Figs. 2a-2b). The sizes of these pieces vary as much as their design (Fig. 14).

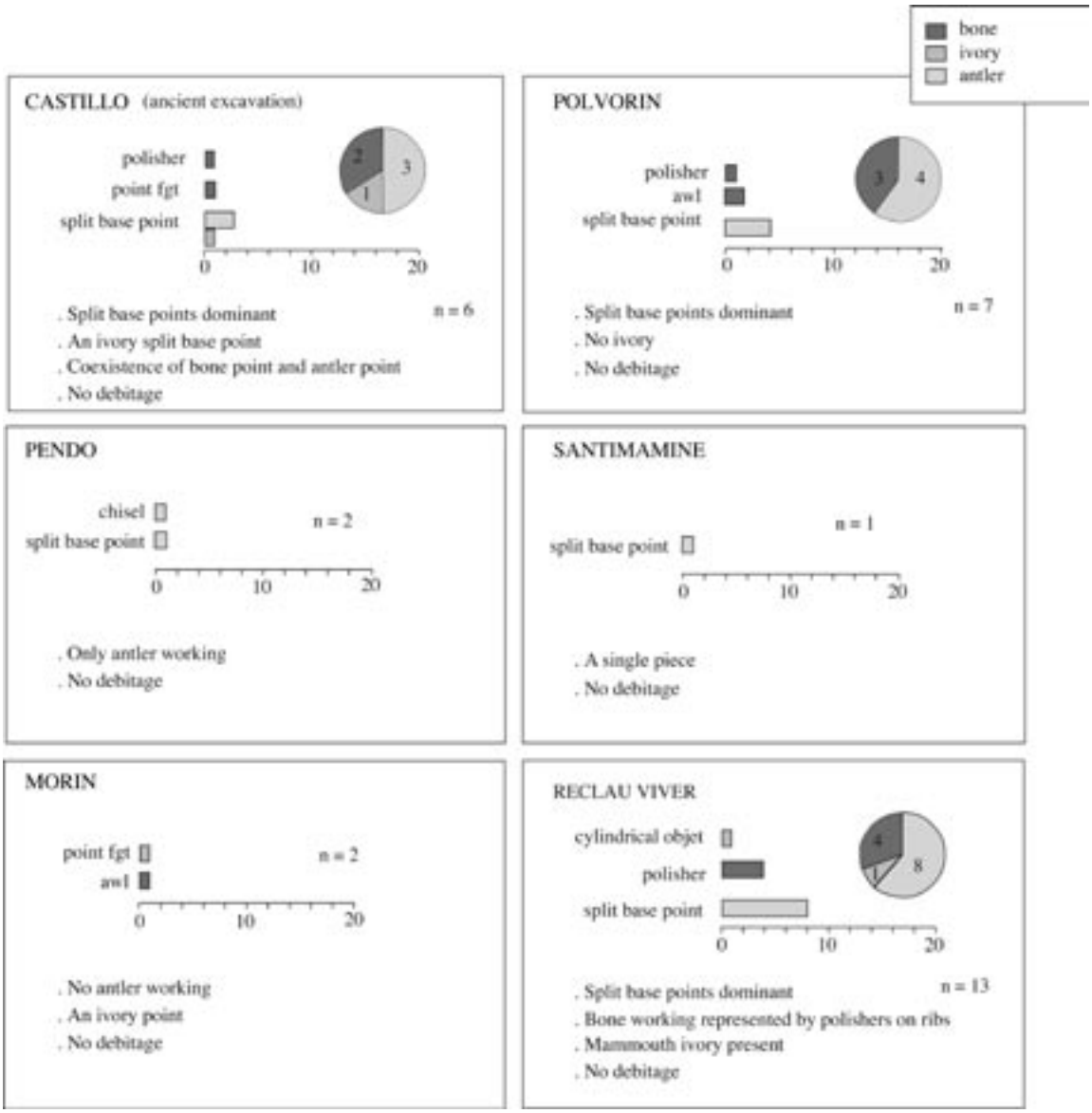

FIG. 12 – Composition of bone tool assemblages from Cantabrian Early Aurignacian sites.

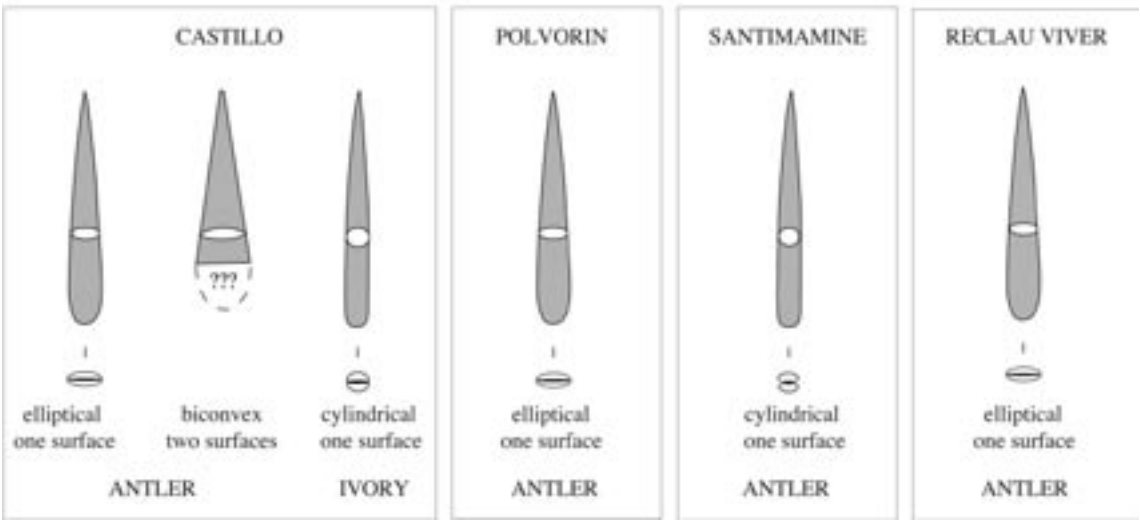

FIG. 13 – Different split-based point designs from northern Spain.

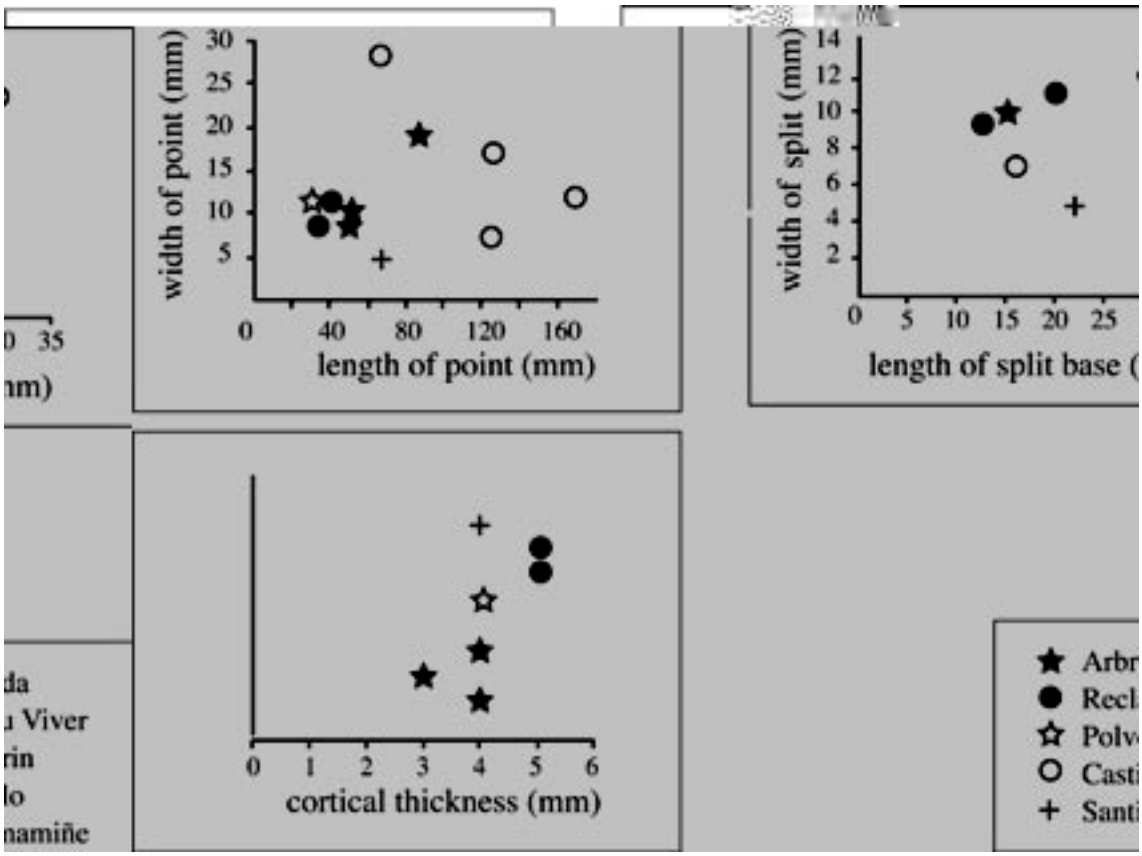

FIG. 14 – Main metric features of split-based points from northern Spain.

How do we explain the Spanish pattern? Given the early dates for El Castillo and l'Arbreda (Bischoff et al., 1989; Cabrera and Bischoff, 1989; but see Zilhão and d'Errico, 1999), is it possible that we are dealing with the earliest stages of the emergence of a bone working tradition, and that the differences between sites north and south of the Pyrenees are of a chronological nature? The fact that bone tools are as rare at sites with dates not as early as those obtained for l'Arbreda and El Castillo suggests that this is unlikely. Bone tools are really not a major feature of the Spanish Aurignacian, Early or Evolved (Bernaldo de Quirós, 1982; Soler and Maroto, 1993).

Another possibility relates to issues of raw-material availability. The reduced cortical thickness of the antler used for the Spanish points (Fig. 14) in any case would not have prevented production. Such problems would also not suffice to explain the absence of bone products, or the special status of ivory, not used for ornaments, contrary to the situation at Tuto de Camalhot and Isturitz, where, although rare, this raw-material is reserved to bead manufacture, as in the Périgord. Availability issues cannot explain either the exceptional case (if confirmed by ongoing research) of a cylindrical split-based point made out of ivory from El Castillo (Fig. 2e), so far the single such point on this raw-material known in Europe. The base of this point was scraped, not split, because the latter technique does not work well with ivory. This difference is telling both of the importance of the implied hafting system, and of the technical distance separating at least El Castillo from the French sites.

If we add to all of this the absence of debitage byproducts (even if the meaning of such absence is rendered ambiguous by the selective conservation of finds practiced in old excavations, which prevents exclusion of the possibility that such byproducts were simply discarded),

the Spanish material is clearly quite different: of reduced numerical importance, bearing witness to a rather diverse array of designs, with no working of bone, and with a particular mode of economic exploitation of ivory. It is conceivable that this pattern relates to the fact that the Spanish pieces are finished objects abandoned away from the place of manufacture; finished objects, in fact, may indeed have circulated among Aurignacian groups as much as raw-materials, ideas, or concepts, with Spanish groups lacking any systematic, routine exploitation of osseous raw-materials for tool manufacture.

This diversity is to be added to that observed in the realm of lithics, and undoubtedly is the expected and logical consequence of the expansion of Aurignacian cultures across Europe. It illustrates the complexity of what is at stake, and may well be related to geographical or chronological distance. Limiting us to these two choices, however, would lead to a view of the Aurignacian as a simple and linear process; one must also consider the fact that such distances precisely indicate that the constitution of the Early Aurignacian resulted from the confluence of population movements operating at diverse rhythms and speeds, in connection with the history of Aurignacian groups in Europe as much as in connection with their initial expansion and processes of diffusion of both objects and know-how as a result of contact between the different groups.

Finally, it must be borne in mind that in systems of a generalized economy such as those of contemporary hunter-gatherers, technical and economic activities are conditioned by the main goal of securing the reproduction of the group's means of subsistence. That is why several scales of social organization exist: nuclear (familiar, ensuring the group's biological reproduction), band (grouping several families in the procurement of daily subsistence), clan (relating several families linked by marriage alliances), and tribe (several families linked by political or economic alliances). Forms of differentiation may operate in multiple fashions at these distinct scales. At the level of the tribe, hunters may well utilize the same range of gear, even wear the same kinds of ornaments, and still differentiate in a fundamental way on the basis of what they eat or do not eat. The Aurignacian must be seen as related to phenomena of this kind, so familiar to ethnologists.

Acknowledgments

I wish to acknowledge Narcis Soler for permission to examine the as yet unpublished collection from l'Arbreda.

I am also grateful to J. Zilhão for his translation of the manuscript.

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