

CHRONOSTRATIGRAPHY OF THE PLEISTOCENE/HOLOCENE BOUNDARY: THE AZILIAN PROBLEM IN THE FRANCO-CANTABRIAN REGION

Lawrence Guy Straus*

ABSTRACT: The chrono-stratigraphic evidence for the Azilian of Vasco-Cantabrian Spain and France is reviewed and found to range from the Allerød to the Preboreal. A survey of the associated artifact and fauna assemblages indicates the transitional nature of the Azilian between the Magdalenian and the Mesolithic. The relationship between Azilian technology and supposedly abrupt adaptations to radically changed environmental conditions at the 10,000 B.P. boundary is not straightforward.

KEYWORDS: Azilian, Franco-Cantabria, Magdalenian, Upper Palaeolithic, Mesolithic, Pleistocene/Holocene boundary, chrono-stratigraphy, radiocarbon, pollen, sedimentology.

1. INTRODUCTION

This article attempts to clarify the question of the precise age of a culture-stratigraphic unit long recognized as transitional between the classic Upper Palaeolithic and Mesolithic: the Azilian. It is clear that normative characterization of prehistoric 'cultures' to 'date' archaeological deposits to paleoclimatic phases is a procedure based on circular reasoning. It is also obvious that it cannot be assumed *a priori* that all Azilian-type assemblages or fossil directors must date to the same (brief) period. Specifically, the assumption that all Azilian deposits should have precisely the same age as those of the classic regions of southwestern France is fallacious. Such normative assumptions are based on a view of culture as a simultaneous ethnic style, rather than the extrasomatic means of adaptation. It is the proposition of this article to investigate the chronology of the Azilian as the culture-stratigraphic unit which corresponds to the Pleistocene-Holocene transition by means of various chronometric methods: radiocarbon, sedimentology and palynology. These methods are independent of the artifact assemblages *per se*, although each is susceptible to errors of interpretation. No single datum and no single site can be considered as conclusive; it is the ensemble of various chronological indicators from various sites which can provide the basis for the establishment of a reliable chronostratigraphy. This article proposes to contribute to the objective elaboration of such a scheme for the Pleistocene-

Holocene transition in the Franco-Cantabrian region (fig. 1).

As a result of his excavations in the cave of El Pendo and other sites in the Province of Santander ('Cantabria'), J. Carballo (1922; 1960) argued that the Cantabrian Azilian was locally derived from the Upper Magdalenian and, consequently, that it was an early manifestation of this 'culture'. Carballo thus placed the 'origins' of the Azilian in Cantabrian Spain, a tendency followed to this day by certain other regional prehistorians, notably his disciple, J. González Echegaray. In recent years a number of sites with Azilian deposits (unfortunately often only impoverished remnants) have been excavated in the region and in the adjacent French Pyrenees. Most of these excavations have incorporated paleoclimatic analyses and radiocarbon dating. Although few are as yet adequately published, a corpus of data is beginning to accumulate concerning the absolute age of the Azilian along the northern flank of the mountain chain formed by the Pyrenees and Cantabrian Cordillera.

The palynological data for the sites in Asturias and Santander have all been produced as a result of analyses by Arlette Leroi-Gourhan and her disciple, Anaïs Boyer-Klein, at the Musée de l'Homme (Paris). Based primarily on Leroi-Gourhan's (1967) interpretation of the pollen record from the cave of

*Department of Anthropology, University of New Mexico, Albuquerque, N.Mex. 87131, U.S.A.

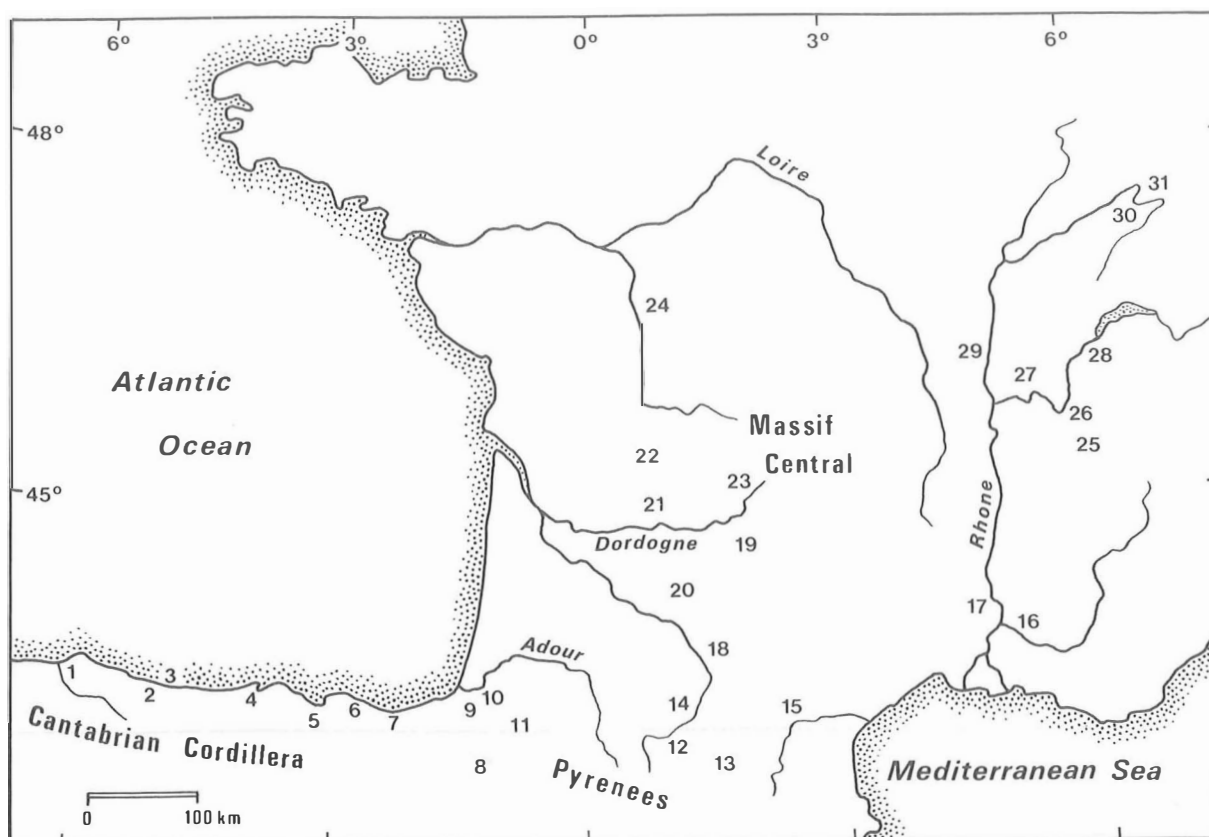


Figure 1. Major Azilian sites discussed in text: 1. La Paloma, Cueva Oscura de Ania; 2. Los Azules; 3. La Riera; 4. El Pendo, Cueva Morín; 5. Arenaza; 6. Santimamiñe; 7. Urtiaga, Ekain, Erralla; 8. Zatoya, Abauntz; 9. Isturitz; 10. Duruthy, Dufaure; 11. Poeymañ; 12. Mas d'Azil; 13. La Vache, Rhodes II; 14. La Tourasse; 15. Gazel; 16. Chinchon, La Salpêtrière; 17. Saut du Loup; 18. Tête du Chien; 19. Pégourié, Graves Piélagó, Rascaño, El Otero; 20. Borie del Rey; 21. Faurélie; 22. Pont d'Ambon; 23. Chez Jugie; 24. Bois Ragot; 25. Jean Pierre I; 26. Thoys; 27. Abri Gay; 28. Les Douattes, Blame-de-Thuy; 29. Varennes-les-Mâcon; 30. Rochedane; 31. Mannlefelsen.

La Vache in the high Pyrenees of Ariège (South-central France), they invariably place Cantabrian Azilian deposits in the Allerød oscillation, which would indeed give this culture-stratigraphic unit relative antiquity (c. 12,000-11,000 years B.P.). Such an assignment has been given by these specialists to Azilian deposits in Cueva Oscura de Ania, La Riera, El Pendo, El Otero, Cueva Morín, and Rascaño. This chronological assignment, based on the interpretation of palynological evidence of sometimes relatively high AP (arboreal pollen) percentages including several thermophile taxa, is contradicted by radiocarbon and/or sedimentological evidence of a Dryas III age (c. 11,000-10,000 B.P.) in the cases of La Riera, Rascaño, Morín and El Pendo and a Preboreal age (c. 10,000-9,000 B.P.) in that of Cueva Oscura de Ania. Reasonable cases for Dryas III age can be made at Piélagó and for Preboreal age at Los Azules. The Azilian levels at

the Basque sites of Urtiaga, Arenaza, Ekain and Abauntz (as well as some possible Azilian deposits at Zatoya in Navarra) are all radiocarbon dated to Dryas III and Preboreal. Palynological interpretations of deposits at Duruthy and Dufaure by M.M. Paquereau (1978; n.d.) coincide with the sedimentological evidence and radiocarbon dates in placing the Azilian levels of these contiguous Gascon sites in Dryas III-early Preboreal.

These data clearly point to the need for a re-analysis of the age of the Vasco-Cantabrian Azilian—is it indeed 'early' or 'late' *vis à vis* the Azilian elsewhere? Two recent doctoral theses, one on the Azilian of Santander and Asturias by J.A. Fernández-Tresguerres (1980) and the other on the Asturian of these two provinces by M.R. González Morales (1982), as well as a polemical article on these two 'cultures' by L.G. Straus (1979), propose the likelihood of a late date for the regional Azilian

and suggest its close temporal relationship (if not partial overlap) with the specialized Asturian shell middens.

A systematic review of the question of Azilian age should begin by a classification of the sites with chronometric information independent of subjective judgements of relative antiquity based on the artifact assemblages themselves. (There are certainly too few well-excavated Azilian *sequences* to provide real bases for any pretence of 'seriation' or other relative chronological methods based on the artifacts (*pace* Garcia Guinea, 1975)). In the case of Vasco-Cantabrian Spain and the adjacent French Basque Country/Gascony, such a classification can be done as follows:

1. *Secure Azilian deposits dated directly by ^{14}C* : Los Azules Level 3-upper; Cueva Oscura de Ania; Urtiaga Level C; Ekain Levels V, IV, III; Dufaure Level 3.

2. *Secure Azilian deposits dated terminus ante and/or post quem by other levels dated by ^{14}C* : Los Azules Level 3^e & 2; La Riera Level 28; Morín Level 1; Duruthy Level 2; Poeymaü 'CPE'.

3. *Possible Azilian deposits dated directly by ^{14}C* : La Riera Level 27; Rascaño Level 1; Arenaza Levels III & II; Zatoya Levels III & II-lower; Poeymaü 'BS'; Abauntz Level 'd'.

4. *Azilian deposits dated only geologically and/or palynologically*: Piélago; El Pendo Level I; El Otero Level 1(?).

5. *Azilian deposit dated terminus post quem geologically or palynologically*: La Paloma Level 2; Isturitz.

Deposits considered to be 'secure' in their Azilian attribution are those which contain flat-section harpoons and no cylindrical-section ones. In some cases (El Pendo, Morín, Dufaure, Rascaño), Azilian harpoons were found in old excavations but not in the recent ones from which the independent chronological data are derived. In these cases correlations of variable security can be made between the relevant strata uncovered in the old and new excavations. In a few other cases (El Otero, Abauntz, Arenaza, Zatoya, Duruthy) no Azilian harpoons (or decorated cobbles) have (yet) been found, but an 'Azilian' attribution is likely or at least possible, due to the stratigraphic position of the deposits in question (*i.e.* overlying the Upper Magdalenian and/or underlying deposits with ceramics) and/or—more problematically—due to the composition of the lithic industries (*i.e.* presence of many 'Azilian' points and high percentages of small

endscrapers on flakes and backed bladelets versus relatively low percentages of burins). Among the other 'possible' Azilian deposits, the assemblage from Poeymaü Level 'BS' is as yet undescribed and is simply said to contain Azilian 'elements', so its assignment is in some doubt. The assignment of Abauntz Level 'd' to the Azilian is based on the characteristics of its lithic assemblage and on its stratigraphic position. La Riera Level 27 directly underlies a level (28) with an Azilian harpoon, overlies another (24) with a Magdalenian harpoon, and contains 10.5% Azilian points and two ochre-stained cobbles, making its assignment to the Azilian 'possible' or even 'probable', despite many similarities to underlying Magdalenian assemblages. These cases point out the inadequacy and circularity (but current inevitability) of normative culture-stratigraphic schemes based on either fossil director artifact types or assemblage compositions described in terms of relative frequencies.

Some of the Vasco-Cantabrian deposits dated by ^{14}C are also dated geologically and/or palynologically, albeit with several cases of conflicting interpretations (as noted above), in which the palynological assessment of age is invariably older than that of sedimentology and/or radiocarbon. Naturally, it should be noted that the data from all these sites are of unequal quantity and quality. The essential relevant facts from each site are presented systematically in geographical order, beginning in the west with the recently excavated Azilian sites of Asturias and Santander.

2. THE SITES OF ASTURIAS AND SANTANDER (CANTABRIA)

2.1. Cueva Oscura de Ania (Las Regueras, Asturias)

This site is located near the confluence of the Ríos Andallón and Nalón in Central Asturias, about 9 km WNW of Oviedo. Excavated and summarily published by J.M. Gómez-Tabanera, M. Pérez and J. Cano (1975; Pérez, 1977), Cueva Oscura de Ania contains two Azilian levels, overlying a sterile layer and an Upper Magdalenian stratum. Level I contained a fragment of a flat-section harpoon and a lithic industry dominated by small endscrapers and backed bladelets. There are at least two flat-section unperforated harpoons in Level II, which apparently has even higher percentages of small endscrapers and backed bladelets, and even fewer

burins than Level I. According to Arlette Leroi-Gourhan and Renault-Miskovsky (1977), the pollen, which are indicative of a warming trend, suggest an Allerød age for the Azilian deposits in this cave. However, the samples are completely isolated, making such a chronological assignment highly speculative. In fact, a radiocarbon date (on unknown material) of about 9,400 B.P. for the Azilian of Cueva Oscura has recently been made public by M. Pérez (cited by González Morales, 1982: p. 59). This would suggest a Preboreal age, however, no specifics have yet been published concerning this date and there are unfortunately no published data on fauna or sedimentology from this site.

2.2. La Paloma (Las Regueras, Asturias)

Located about 2 km north of Cueva Oscura de Ania in the valley of the Río Soto, the cave of La Paloma contained a long Magdalenian and Azilian cultural sequence excavated in 1914-15 by E. Hernández-Pacheco, with the collaboration of J. Cabré and P. Wernert, as well as the Conde de la Vega del Sella. Recently a restudy of this important site was published by M. Hoyos *et al.* (1980). According to these authors, the levels variously labelled as '2', 'b' and 'c' in different parts of the cave correspond to the Azilian deposit described by Hernández-Pacheco. They were able to locate and study 263 retouched tools from this level. Over half (51.7%) are endscrapers (mostly on small flakes) and 20.2% are backed bladelets (despite the early date of the excavation and subsequent vicissitudes of the collections). There are 4.6% Azilian points and only 6.4% burins. The bone industry includes a flat-section harpoon with a circular basal perforation.

The extant faunal collection from the Azilian level is dominated by *Cervus* (MNI=11), but also includes *Sus* (MNI=1, the only boar in the whole 5-level sequence) and *Capreolus* (MNI=2), both classic woodland species. La Paloma lacks radiocarbon dates and palynological analyses, and the Azilian level could not be studied sedimentologically, as it was entirely dug out, leaving no clear witness section which could be sampled. Level 3, also now missing, was a thin, stony, nearly sterile deposit with a possible Magdalenian harpoon. Level 4, with a high proportion of large angular spalls, and containing a 'Late Magdalenian' industry with uniserial and biserial harpoons, was formed under cold, dry conditions. This rigorous climatic episode could conceivably correspond to Dryas II or III.

2.3. Los Azules I (Cangas de Onís, Asturias)

This small cave, located in the mountainous interior of eastern Asturias on a hillside dominating the confluence of the Ríos Guëna and Sella, is at present the most important Azilian site in the Cantabrian region due to its meticulous, extensive, on-going excavation and publication by J.A. Fernández-Tresguerres (1980, with refs.). Los Azules I is especially well-known for its Azilian burial with associated grave goods. The stratigraphy is as follows:

Level 1: sterile yellowish clay which reached the roof of the cave mouth.

Level 2: compact reddish clay with a small Azilian industry and evidence of solifluction.

Level 3a, b, c & d (=3-upper) plus 3e: alternating reddish and blackish hearth lenses with abundant residues of Azilian occupation.

Level 3f: lens localized in the cave interior, as yet (1980) essentially unexcavated.

Level 4: sterile yellowish clay.

Level 5: reddish-brown sediments with Upper Magdalenian material.

Level 6: black sediments with Magdalenian material.

The burial was situated between lenses 3a and 3d, which were themselves intact and undisturbed by the grave excavation. Level 2 contains Azilian points and harpoons, despite the limited size of its artifact assemblage (69 stone tools), which is dominated by typical small endscrapers on flakes and backed bladelets. Levels 3a-d are artifactually homogeneous. The 1819 retouched tools are dominated by backed bladelets (43.9%) and endscrapers (23.8%)—most of which are on small flakes—with few burins (5.1%) and two atypical triangles. There are 8.0% Azilian points and 12 flat-section harpoons, several of which were in direct association with the burial, as were some of the painted cobbles found in Levels 3a-d. Level 3e yielded 761 retouched tools: 40.6% backed bladelets, 23.7% endscrapers (mostly on small flakes), 8.9% Azilian points, and only 3.0% burins. There are also flat-section harpoons and a few painted cobbles.

Levels 3a and 3d have been radiocarbon dated (with wood charcoal samples). Undisturbed Level 3a, overlying the burial, dates to 9,430±120 B.P. (CSIC-216) and Level 3d, equally intact and underlying the burial, dates to 9,540±120 B.P. (CSIC-260). Preliminary palynological results summarized by Fernández-Tresguerres (1980: p. 128), include an AP of about 65% for the basal part of Level '3-upper', including *Betula*, *Corylus*, *Pinus* and

Ulmus. Arboreal pollen decrease somewhat in the middle of Level '3-upper', while those of the *Gramineae* increase. However, the AP increases again in Level 3a. Fernández-Tresguerres places 3-upper in the Preboreal and the solifluction of Level 2 in the late Preboreal/early Boreal. The (as yet unquantified) fauna of Los Azules Level 3 is globally dominated by *Cervus elaphus*, but *Sus scrofa* is also abundant, while *Capreolus capreolus* and other species which prefer wooded habitats (*Felis sylvestris*, *Meles meles*) are also present (Fernández-Tresguerres, 1980: p. 41). All these data clearly indicate a Post-Pleistocene age (probably Preboreal) for the Upper Azilian levels at Los Azules I. The total disappearance of *Littorina littorea* from the molluscan fauna of Levels 3-upper and 2 may be an added indicator of Post-Pleistocene age, since this species is relatively intolerant of warmer ocean temperatures (Clark, 1976: p. 233).

Recently a series of bone collagen ^{14}C dates has been published for the lower part of the Los Azules Azilian sequence: Level 3d/e: $10,400 \pm 90$ B.P. (BM-1879); Level 3e: $10,330 \pm 190$ B.P. (BM-1875), $10,700 \pm 190$ B.P. (BM-1876), $11,190 \pm 350$ B.P. (BM-1877); Level 3f: $10,720 \pm 280$ B.P. (BM-1878) (Burleigh *et al.*, 1982; Fernández-Tresguerres, pers. comm.). These dates, which are coherent among themselves and *vis à vis* those of the upper levels when standard deviations are taken into consideration, indicate that the Los Azules Azilian spanned the whole of Dryas III as well as Preboreal. The statement by Burleigh *et al.* (1982) that these are 'shell-midden' levels is inexact, as Los Azules contains no true shell middens. Molluscs are present but rare.

The Preboreal age of the Los Azules burial is doubted by Newell *et al.* (1979: p. 160), who believe it to be of Palaeolithic date, on the grounds that the associated buttonhole perforated harpoons are not of Mesolithic type and that the associated mussel (*Modiolus barbatus*) is absent from Asturian (Preboreal/Boreal) shell middens in this region. On the first count, buttonhole perforations are in fact far more common in Azilian harpoons than round perforations in the Vasco-Cantabrian region (Carballo, 1960: pp. 164-173; Barandiarán, 1967: pp. 322-323; Fernández-Tresguerres, 1980: pp. 145-147). These types have indeed been found to lack relative chronological value (Nougier & Robert, 1977). On the second count, a search of over a dozen Vasco-Cantabrian Palaeolithic site reports failed to reveal a single find of *Modiolus barbatus*. It is found, however, at present in the Bay of San-

tander (Clark, 1976: p. 343), and would hardly qualify as a strong indicator of Pleistocene age for the Los Azules burial.

2.4. La Riera (Posada de Llanes, Asturias)

La Riera is a relatively small cave situated at the base of the south face of the Llera ridge, 1.5 km from the present shore of the eastern sector of Asturias. Discovered and first excavated by the Conde de la Vega del Sella during the First World War, La Riera contained a nearly complete, intact stratigraphic sequence spanning the period from the Solutrean through the Asturian. Sandwiched between the Upper Magdalenian and the Asturian shell midden, Vega del Sella (1930) found a thin Azilian layer with a typical flat-section harpoon (with buttonhole perforation) and a scanty lithic industry. Obermaier (1925) claimed that a painted cobble was also found, but this piece was never figured, nor is it mentioned by Vega del Sella; it is at present missing from the old La Riera collections.

Subsequent test excavations by G.A. Clark and by Gómez-Tabanera and M. Pérez did not involve the Azilian stratum. However, the recent project directed by Clark and L.G. Straus (Straus *et al.*, 1981; Straus & Clark, 1986) revealed a series of Tardiglacial and early Holocene deposits, one or more of which is attributable to this culture-stratigraphic unit. Level 24, with a cylindrical-section biserial harpoon fragment and rich lithic and bone industries typical of the Upper Magdalenian, is dated (on charcoal) to $10,890 \pm 430$ B.P. (GaK-6982). (In Level 24, as in El Pendo Level II and a few other deposits assigned by the analysts to the Upper Magdalenian, endscrapers outnumber burins despite the norm to the contrary, and there are several Azilian points). This level presents geological evidence of cold, albeit humid climatic conditions, attributable to Dryas II, according to the analysis of H. Laville. However, palynologically it is considered to be Allerød in age; with a lowered AP (including birch) in the analysis of Arlette Leroi-Gourhan, and, given the range of error in its radiocarbon date, it could pertain to a cool episode within this oscillation. The Level 24 fauna studied by J. Altuna includes a few remains of reindeer. The overlying Level 25 is a discontinuous calcium carbonate crust with only two denticulates as its tool assemblage. Level 26 is a thin, charcoal-stained lens with a small lithic industry which has 11.5% endscrapers, several backed bladelets, microgravette and Azilian points, and

virtually no burins. Sedimentologically, Levels 25 and 26 indicate temperate and very humid climatic conditions attributable to the Allerød interstadial. *Sus* is present and *Capreolus* is relatively abundant, however, *Littorina littorea* is still fairly frequent in the small molluscan assemblage, though less so than in Level 24. *Monodonta lineata*, absent in the latter level, makes a timid appearance in Level 26. There are no ^{14}C dates for Levels 25–26.

Level 27 is a thick deposit, rich in mollusc shells (still including *Littorina*), artifacts, bones and éboulis. The 105 stone tools include 17.5% endscrapers, 7.6% burins, 29.8% backed bladelets *sensu stricto*, plus 10.5% Azilian points. There are 2 cobbles with traces of red ochre. The fauna includes *Sus* and *Capreolus*, but there are also remains of the Nordic vole (*Microtus oeconomus*). Level 28 is a very thin, localized lens with only 32 lithic tools (17 of which are backed bladelets and 3 of which are Azilian points). A nearly complete flat-section, uniserial harpoon with four barbs and a basal 'buttonhole' perforation was, however, found in this level, along with a cobble bearing red ochre traces. The few faunal remains include some of *Sus* and of *Capreolus*. Both Levels 27 and 28 are sedimentologically considered to be the products of colder but still humid climatic conditions attributable to Dryas III. Although the AP is still not very high, a broad diversity of thermophile taxa leads Arlette Leroi-Gourhan (as usual) to assign these levels to Allerød. However, the bone collagen ^{14}C date of $10,635 \pm 120$ B.P. (BM-1494) for the upper part of Level 27 corresponds to Dryas III. A second (bone) date from lower Level 27 of $12,270 \pm 400$ B.P. (UCR-1275D) corresponds to Allerød even at -2 s.d. (A third (charcoal) date of $14,760 \pm 400$ B.P. (GaK-6985) is far out of stratigraphic order and is clearly far too old for a Terminal Würm deposit). The contradictions among these ^{14}C dates remain unresolved, although vertical movement of sample items and interlaboratory errors are both possible explanations. Level 28 is directly overlain by the Asturian *conchero*, the base of which dates (on charcoal) to $8,650 \pm 300$ B.P. and is assigned to the late Preboreal or early Boreal. It is problematical to differentiate the large lithic assemblages of Levels 24 and 27, but Levels 24 and 28, with their distinctive harpoons, are Upper Magdalenian and Azilian respectively, by definition. Probable or certain Azilian Levels 25–28 would seem to span the latter part of Allerød and Dryas III.¹

2.5. El Pendo (Escobedo de Camargo, Santander)

The immense cavern of El Pendo is situated at the base of a large dolina in hills which dominate the Santander coastal plain. Explored since the earliest years of prehistoric investigation in the last quarter of the 19th century, El Pendo was sporadically excavated for four decades by J. Carballo (1960) during the first half of the 20th. He found several flat-section harpoons in different parts of the cave. These finds were supposedly made *in situ* in stratigraphic superposition above an Upper Magdalenian deposit, and constituted the basis of Carballo's theory of a gradual, early transition between the Magdalenian and Azilian in Cantabrian Spain.

In 1953–57, an international team, directed by J. Martínez Santa-Olalla in collaboration with André Leroi-Gourhan and A. Cheynier, conducted a major excavation in another sector of the El Pendo entrance, results of which were only recently published by J. González Echegaray (1980). The upper part of the stratigraphy of the immense Post-Palaeolithic, Upper and Middle Palaeolithic sequence consists of Levels 0 (modern debris and Bronze Age), Oa (stalagmitic layer), I (18 cm-thick dark silt level–Azilian), Ia (sterile stalagmitic layer) and II (50 cm-thick dark silt level–Terminal Magdalenian). No harpoons were found in the 1953–57 excavation of Level I, however, the lithic industry, which includes 119 tools, seems to correspond to the Azilian, with 25.2% endscrapers, 16.7% backed bladelets, 5.0% Azilian points (despite curation problems after the death of Santa-Olalla), and 18.5% burins (González Echegaray, 1980). The old pollen analysis by Arlette Leroi-Gourhan (published in 1980) is, by her own admission, rather unsatisfactory, as only a few samples were taken–discontinuously– throughout the long sequence. Three samples from Level II are low in arboreal pollen, but include *Pinus*, *Corylus* and *Juniperus*, with some *Hippophae* and abundant *Ericaceae*, suggestive of the transition from Dryas II to Allerød according to Leroi-Gourhan. No sample was taken from Level I *per se*, but from the stalagmitic layer *overlying* it. This sample, very rich in pollen, is overwhelmingly dominated by arboreal taxa, including over 50% *Corylus*, plus *Fagus*, *Quercus*, *Fraxinus*, and *Pinus*, as well as *Hedera*, *Viburnum* and numerous ferns. Leroi-Gourhan assigns this travertine layer to the Boreal. The travertine layer *underlying* the Azilian Level I would be assignable to Allerød. A sedimentological analysis was more recently conducted by Butzer

(1980). The stalagmitic layer underlying Level I *per se* is considered evidence of a possible temperate, humid episode, perhaps attributable to Allerød. Level I itself, with a certain amount of frost-weathering debris, was formed under cold, albeit periodically humid conditions corresponding to Dryas III and the beginning of the Holocene. The Level I fauna, heavily dominated by *Cervus*, includes several remains of *Capreolus* and a few of *Sus* (Fuentes, 1980). Naturally, given the huge size of the cave, it is impossible to date precisely the Azilian harpoons found by Carballo in other parts of the entrance by the results obtained in the Santa-Olalla excavations, which uncovered the earlier discussed probable Azilian industry lacking harpoons and dating, apparently, to Dryas III-Preboreal.

2.6. Cueva Morín (Villanueva de Villaescusa, Santander)

This well-known Middle and Upper Palaeolithic cave site, located near the edge of the coastal plain surrounding the present bay of Santander at the foot of a coastal mountain range, was excavated various times, notably by J. Carballo, the Conde de la Vega del Sella, and, most recently, J. González Echegaray and L. Freeman (1971). A thin Azilian deposit, localized near the cave mouth, was found in all these excavations sandwiched between a superficial travertine crust (in places containing mollusc shells) and an Upper Magdalenian level. Typical flat-section Azilian harpoons were found by both Carballo and Vega del Sella. Both early excavators speak of abundant small endscrapers and backed bladelets, plus some geometric microliths (see summaries in Fernández-Tresguerres, 1980: pp. 96-99). The remnants of this ephemeral Azilian level (I) excavated in 1968-69 yielded 359 retouched stone tools, of which 13.6% are endscrapers, 23.0% backed bladelets, and only 7.2% burins. Although there are no Azilian points *sensu stricto*, microgravette points make up 5.0% of the assemblage, and there are indeed six geometric microliths (a circle segment and 5 triangles). No Azilian harpoons were found in the very limited recent excavation of this level.

There is a geological (and cultural) hiatus between Levels 2 (Upper Magdalenian) and 1 (Azilian). Level 1 contains abundant pollen of hazel and pine, with small quantities of birch, alder and oak; the *Cichorieae* are more numerous than the *Gramineae*. Leroi-Gourhan (1971a) assigns this level to

Allerød; however, the sedimentological analysis of Butzer (1973) indicates evidence of considerable contemporaneous frost weathering. These cold conditions probably date to Dryas III. The travertine directly overlying Level 1 dates to $9,000 \pm 150$ B.P. (I-5150) and would correspond therefore to the Preboreal. The small faunal assemblage from Level 1, overwhelmingly dominated by *Cervus*, includes one *Capreolus* bone and two of *Sus*. The Cueva Morín Azilian problem is like that of La Riera Levels 27-28, where there is sedimentological evidence of cold climatic conditions attributed to the brief and relatively attenuated Dryas III episode, but with a fairly high AP and a few remains of species of mammals which prefer woodland habitats.

2.7. Rascaño (Mirones, Santander)

Rascaño is a cave located in a cliffside dominating the canyon of the Río Miera in the foothills of the Cantabrian Cordillera in Santander. This specialized ibex-hunting station was successively excavated in the first two decades of this century by J. Carballo, L. Sierra and H. Obermaier, but was never extensively published. These prehistorians all mention the discovery of an Azilian level or at least 'typical' Azilian tools: microliths, small endscrapers (see summary in Straus, 1981). However, the only one to claim the presence of Azilian harpoons is Carballo, who does so in his doctoral thesis (1922) and in a general text (1924), but giving no illustration thereof. No Azilian harpoons are present in the small remnant collections from these early excavations.

Rascaño was rediscovered by L.G. Straus and once again excavated in 1974 by J. González Echegaray, I. Barandiarán and him. Little remained, particularly of the uppermost level (I) which probably corresponds to the supposed Azilian stratum of the earlier excavators. Level 1 contained only 13 stone tools and 4 bone artifacts (but no harpoons). Sedimentologically this level is considered to be cold and dry due to the presence of large quantities of frost-weathering products; it is assigned to Dryas III and is capped by a travertine layer assigned to the early Holocene (Laville & Hoyos, 1981). In contrast, with an AP reaching 18% (only) and including relatively many hazel pollen but few of pine, alder or oak, together with many fern spores, Level 1 is assigned to Allerød by Boyer-Klein (1981), explicitly following the lead of her mentor, Leroi-Gourhan. It should be noted that

her two samples—both from the lower part of the stratum (1.3) which is a loose, open rubble—are very poor in pollen. Level 1.3 dates to $10,485 \pm 90$ B.P. (BM-1449) and 1.2 to $10,560 \pm 245$ B.P. (BM-1448). The dates overlap at 1 s.d. and correspond to a Dryas III age. They are preceded by dates of $12,280 \pm 165$ B.P. (BM-1450) and $12,895 \pm 135$ B.P. (BM-1451) for Upper Magdalenian levels 2.1 and 2.3 respectively. All are bone collagen dates. Level 1 is the only Rascaño stratum to contain remains (albeit few) of *Sus scrofa* (Altuna, 1981).

2.8. Piélago (Mirones, Santander)

The cave of Piélago is situated a short distance downstream of Rascaño on the same right bank of the Río Miera gorge. Excavated by M.A. García Guinea, this site remains unpublished except for a brief reference (García Guinea, 1975). The site is said to have three Azilian levels (with flat-section harpoons) and an underlying 'Proto-Azilian' layer (which lacks harpoons). All four levels are said to contain Azilian points, as well as triangles and other geometric microliths, which are rare in Cantabrian Spain.

Fernández-Tresguerres (1980) is skeptical about these as yet unillustrated geometric elements, although the collections displayed in the Museo de Prehistoria of Santander do include some geometrics, along with Azilian harpoons and points. As at Rascaño, the fauna is said to be dominated by ibex—not surprising due to the surrounding steep, rocky cliffs—with some chamois and red deer. A sedimentological analysis by Butzer (1973) points to the presence of numerous cryoclastic elements in the Piélago Azilian (level unspecified), suggesting a Dryas III age.

2.9. El Otero (Secadura, Voto, Santander)

The topmost level of this cave site, located near the estuary of the Río Asón in eastern Santander, is very tentatively assigned to the Azilian. However, there are only 4 lithic tools, 2 antler 'awls' and no harpoons in the Level 1 collection (González Echeagaray *et al.*, 1966). This stratum overlies a supposed 'Magdalenian VI' level (2b), from which it is separated by a stalagmitic layer (Level 2a). A solitary 'quadrangular'-section biserial harpoon tip fragment was found in Level 2b, while Level 3 contains several classic cylindrical-section uniserial harpoons, and is clearly Upper Magdalenian by definition. Although burins (20%) slightly outnumber endscrapers (16.5%) in the small (c. 60

tools) Level 2b collection, there is in reality no strong reason for assigning it to the Terminal Magdalenian (as do the excavators), rather than to the Azilian. The excavators consider it to be of possible Allerød age, although they present no independent evidence in support of such an hypothesis.

According to Arlette Leroi-Gourhan (1966), two pollen samples were taken from "the Epipalaeolithic layers (Magdalenian and Azilian?) near the present surface". However, in her diagram the two isolated uppermost samples are both attributed to Level 1, with none for either Levels 2 or 3. The Level 1 samples have an AP of 3-4%, with a few pollen of *Quercus*, *Juglans*, *Corylus*, *Alnus*, *Tilia*, *Buxus*, as well as those of juniper, pine and birch and many spores of ferns. Level 1 is nonetheless considered to have had climatic conditions somewhat more temperate and humid than Magdalenian Level 4 (for which there are samples that lack thermophile arboreal taxa and are poor in fern spores). In a subsequent article, Leroi-Gourhan (1971b) assigns the El Otero 'Azilian' level (1) to Allerød and the Terminal Magdalenian 'with Azilian influences' (*i.e.* Level 2b) to Dryas II. There are no radiocarbon dates or sedimentological analyses from this site which might have helped to clarify the age of Levels 1 and 2. The fauna of Level 1 includes red deer, ibex, chamois and boar, while Level 2 contains all these species, plus roe deer, horse and bovines (Madañaga, 1966).

Fernández-Tresguerres (1980) suggests an Allerød age for the stalagmitic layer (Level 2a) separating the El Otero Levels 1 and 2b. He notes the existence of a similar stalagmitic layer between the final Magdalenian and Azilian (with typical harpoons) at the famous, but undated site of El Castillo in central Santander; he hypothesizes—albeit without additional supporting evidence—an Allerød age for this travertine. It should be recalled that an analogous situation exists in the stratigraphy of nearby El Pendo cave and that there may have been erosion in this same period between the deposition of the Upper Magdalenian and Azilian levels at the also neighboring site of Cueva Morín. Similar erosion, specifically at the end of Allerød, is observed between the Magdalenian VI and Azilian at Duruthy on the edge of the French Basque Country.²

2.10. El Castillo (Puente Viesgo, Santander)

The vestibule of this vast cave was excavated in 1911-14 under the direction of Hugo Obermaier,

who uncovered a stratigraphy 16-18 m deep but never published a complete report of his work. According to Fernández-Tresguerres (1980: p. 53) and Cabrera (1984: pp. 377-381) the extant artifact assemblage from the thin but laterally extensive Azilian deposit is very small (12 tools), but does include three typical flat section harpoons, one of which is bilaterally barbed (Breuil & Obermaier, 1912: p. 10). Butzer (1981: pp. 164, 168, 174, 176) equates his level 18 with Obermaier's Azilian deposit and, because of an angular scree rubble content, concludes that it was formed under conditions of cold with slope instability which he would attribute to Dryas III. It should be noted that the stalagmitic layer separating the Azilian and Upper Magdalenian deposits may not have been ubiquitous in the Castillo site (*cf.* Breuil & Obermaier, 1912: p. 10 contra Obermaier, 1925: p. 176).

3. THE SITES OF VASCONGADAS (EUZKADI & NAVARRA)

3.1. Arenaza I (San Pedro de Galdames, Vizcaya)

There are a number of Azilian sites in the two coastal Spanish Basque provinces (plus Navarra). Unfortunately none of the recent excavations has yet been adequately published, so the data are even scantier than those of the Azilian sites in Santander and Asturias to the west or the French Basque country and Pyrenees to the east. Arenaza I, a cave with Upper Palaeolithic paintings of hinds done in a style very similar to that of paintings in caves in eastern and central Santander, is located in hill country not far inland of the city of Bilbao. It is currently being excavated, and only summary reports have been published to date (Apellániz & Altuna, 1975). The stratigraphy in the vestibule is capped by Roman, Bronze Age and Neolithic deposits, below which is a complex bed (II) composed of several levels with a scanty lithic industry described as an 'atypical Tardenoisian'. Level D of this bed dates to $9,600 \pm 180$ B.P. (CSIC-173), a charcoal date which would make this stratum contemporaneous with Level 3-upper at Los Azules, although no Azilian harpoons have been found at Arenaza.

Underlying Bed III is dated (on bone) to $10,300 \pm 180$ B.P. (CSIC-174). Its lithic industry which notably includes backed bladelets, small endscrapers on flakes and nucleiform endscrapers, is inexplicably (and incorrectly) labelled 'Asturian'

(Apellániz & Altuna, 1975: p. 153). The authors do not consider it to be Tardenoisian, it lacks geometric microliths. Azilian (and Magdalenian) harpoons are thus far missing. The scanty fauna from Bed III is heavily dominated by *Cervus elaphus*; followed by *Capra pyrenaica*, *Sus scrofa* and *Capreolus*. Interestingly, there is one remain of *Canis familiaris*, which, if *in situ*, would be one of the oldest known evidences of dog. Lacking further information, it is risky to affirm an Azilian attribution for these small Aranaza artifact assemblages. There are as yet no paleoclimatic analyses available for corroboration of a tentative Dryas III and Preboreal dating of Beds III and II, respectively.

3.2. Santimamiñe (Cortezubi, Vizcaya)

This large cave, with well-known Upper Palaeolithic paintings in interior galleries, lies in a mountainside above Guernica and was excavated during the first two decades of this century by T. Aranzadi and J.M. de Barandiarán (1935) and more recently re-excavated by Barandiarán (1962). The vestibule contained a long Upper Palaeolithic, Mesolithic and Neolithic/Eneolithic stratigraphic sequence, which was unfortunately dug 'too early' and published in a rather confusing fashion. The totality of its collections has never been studied systematically, although A. Cava (1975) has analysed the post-Azilian materials. According to the excavators (Aranzadi & Barandiarán, 1935 and an unpublished stratigraphic section on file in the Museo Histórico de Vizcaya in Bilbao), it is *Level 5*, underlying a so-called Asturian shell midden and overlying a Terminal Magdalenian level in the cave mouth, which is Azilian by definition, since it has a flat-section harpoon. A radiocarbon date of $9,470 \pm 400$ B.P. (Gif-130), done on bones collected in 1960 and attributed to 'Level 7', has been published by Delibrias *et al.* (1966: p. 88) who say the date corresponds better to Level 6. How the level attribution of the sample was determined is quite unclear, as there was no Level 7 in the 1960 excavation, and the date is rejected by Barandiarán himself (Mariezcurrrena, 1979: p. 242). 'Level 7' in the original scheme of Aranzadi and Barandiarán (1935) corresponds to the Solutrean. This ^{14}C date has indeed sometimes been cited as pertaining to Level 6 (Final Magdalenian) (Moure, 1975: p. 30; Almagro Gorbea, 1970: p. 13). González Morales (1982: p. 183) has inexplicably suggested that this date might in reality pertain to Level

5, the Azilian. Of the Level 5 fauna (Altuna, 1972), we only know that it contained red deer, bovines, horse, ibex, roe deer, boar, chamois and several carnivores, plus many birds and molluscs. Without further studies of the industry and fauna, and lacking geological and palynological analyses, as well as reliable radiocarbon dates, it is impossible to give a creditable estimate of the age of this deposit, except to suggest that the Gif date might be based on a mislabelled or misinterpreted sample which in reality came from Level 5.

3.3. Urtiaga (Itziar de Deba, Guipúzcoa)

This important site, located in the rugged coastal hills of Guipúzcoa, was dug by J.M. de Barandiarán in the late 1920's and 1930's but has never been comprehensively published. The Azilian and Magdalenian lithic assemblages have been studied at different times by J.M. de Barandiarán and D. de Sonneville-Bordes (1964), Laplace and Merino (1979) and Marsan (1979), and the bone industries by Barandiarán (1967). Level C, which surmounts a long sequence of Middle and Upper Magdalenian deposits, contained a flat-section harpoon and a lithic industry heavily dominated by backed bladelets (26.2%) and Azilian points (c. 50%). Burins and endscrapers—both rare—are in rough equilibrium (8.45% and 7.27% respectively), according to Barandiarán and De Sonneville-Bordes.

Several years ago shells from Level C were radiocarbon dated to $8,700 \pm 170$ B.P. (CSIC-63)—the most recent date from a Spanish site definitely attributed to the Azilian by the presence of a classic harpoon. This date might be somewhat young (although at +2 s.d. it exceeds 9,000 B.P.), but there is no reason for rejecting it *a priori*. (Likewise, shells from underlying Terminal Magdalenian Level D have been dated to $10,280 \pm 190$ B.P. (CSIC-64). There are no sedimentological or palynological analyses for Urtiaga which could help date Level C and either confirm or reject its apparent Preboreal age. The mammalian fauna includes *Capreolus* and *Sus*, along with 'alpine' caprids and abundant red deer. Four dog remains (from 1 individual) found in Level C may be intrusive (Altuna, 1980: p. 16). It should be noted that reindeer remains, which are unusually abundant for a Spanish site in the Urtiaga Magdalenian levels, are absent from Level C (Altuna, 1972). Newell *et al.* (1979: p. 192) point out that sheep/goat remains were also found in Level C. In fact there are two domesticated goat bones with Level C labels. Altuna (1980: pp. 16-18),

in his recent monograph on animal domestication in the Basque country, convincingly argues that these remains are either intrusive (there is some evidence of badger disturbance, albeit not in the sector where these bones were found) or mislabelled. Both the dog and goat bones are whole and much better preserved than the rest of the bones in Level C, which is repeatedly assigned to the Azilian by Altuna (*e.g.* 1972; 1980; Altuna *et al.*, 1982; see also Mariezkurrena, 1979). There is no reason to believe that the ^{14}C determination dates intrusive shells, although this possibility cannot be totally excluded. If aquatic shells were those dated, the 'real' date could in fact be even younger. The claim made by Newell *et al.* (1979, p. 192) that Urtiaga Level C contained 'Asturian' artifacts is unfounded. I could find no reference to such pieces at Urtiaga, although they have been made for Santimamiñe, Lumentaxa and Mouligna (Barandiarán, 1953).

3.4. Ekain (Deba, Guipúzcoa)

Ekain is a major Upper Palaeolithic rupestral art sanctuary with a small site in the cave entrance which includes Magdalenian and Azilian levels. It is located in hill country not far from Urtiaga and several other sites. A complete report on the recent excavations by Altuna and Merino (1984) has just been published. A preliminary report (Barandiarán & Altuna, 1977) clearly shows that at least levels III-V are Azilian with flat-section harpoon fragments. Backed bladelets and backed ('Azilian?') points are very numerous. The lithic industry of Level II is said to have some Azilian characteristics, but with elements (*e.g.* microburins) suggestive of the Sauveterrian; it lacks harpoons (Altuna *et al.*, 1982: p. 12). The end of the Magdalenian sequence (base of Level VI/top of VII) is radiocarbon dated (on bone) to $12,050 \pm 190$ B.P. (I-920). Overlying Level V has been (charcoal) dated, however, to $13,350 \pm 250$ B.P. (CSIC-172) and Level III to $12,750 \pm 250$ B.P. (CSIC-171). If correct, these dates would make the Azilian levels considerably older than the underlying Upper Magdalenian. But there are also bone dates for Levels IV & II of $9,460 \pm 185$ B.P. (I-9239) and $9,540 \pm 210$ (I-11666) which are accepted by the excavators, who reject the CSIC dates for Levels III and V (Barandiarán & Altuna, 1977: pp. 52-53; Mariezkurrena, 1979: pp. 241-242; Altuna, 1984: p. 43). These two dates for Levels IV and II overlap at 1 s.d. They would make the Ekain Azilian contemporaneous with Los Azules Level

3-upper and Cueva Oscura de Ania if their dates are correct. Recent pollen results (Dupré, 1984) place the end of the Magdalenian sequence (Level VI) in Allerød, followed by a brief cooling and then by the definitive return of warmer, more humid conditions, with an increase in (especially thermophile) trees (Preboreal). No chronological conclusions are drawn in the Ekain sediment analysis (Areso, 1984), although Levels IV-II are generally temperate with a brief cold snap in the course of Level III. The fauna from the Azilian levels includes dominant *Cervus* with 'alpine' caprids and *Capreolus*. *Sus* is present only in Levels III and II (Altuna *et al.*, 1982: p. 61).

3.5. Erralla (Cestona, Guipúzcoa)

This small cave, located near Ekain, has recently been dug by Altuna and his team from the Sociedad de Ciencias Aranzadi. Archaeologically sterile Level IV has been radiocarbon dated (on bone) to $10,580 \pm 270$ B.P. (I-10803); it overlay a Middle Magdalenian level. An early publication (Mariez-kurrena 1979: 240) attributed the overlying deposit to the Azilian, but the definitive site report (Altuna *et al.*, 1985) attributes it to the Terminal Magdalenian, based in part on a new date (on bone) of $12,310 \pm 190$ B.P. (I-13439) for Level III. There are no harpoons and the small lithic assemblage is banal, belying attempts to use it to date Level III to the Bølling or Allerød by the geologists and palynologist in question.

3.6. Zatoya (Abaurrea Alta, Navarra)

This site, located at c. 900 m above sea level on the edge of the Pyrenees near the French border, was recently excavated by Barandiarán (1977; 1979) and dated by Evin (1979; Evin *et al.*, 1979). The uppermost level (I) is Neolithic, bone dated to $6,320 \pm 280$ B.P. (Ly-1397), with ceramics but no domesticated animals. It overlies a level (Ib) with a pre-Neolithic stone industry charcoal dated to $8,260 \pm 550$ B.P. (Ly-1457) and containing many geometric microliths attributed to the Sauveterian(?). Level II in the cave entrance has been variously labelled as 'Azilian', 'epi-Azilian' or 'Azilian-like' (Barandiarán, 1977; 1979; Evin, 1979; González Morales, 1982). The lower part of this level, which is c. 60 cm thick, has been radiocarbon dated (on bone) to $11,480 \pm 270$ B.P. (Ly-1399), and $11,620 \pm 360$ B.P. (Ly-1599), whereas the top of Level II has been charcoal dated to $8,150 \pm 170$ B.P.

(Ly-1398). No Azilian harpoons have been found and bone tools are virtually absent, but the Level II Epipalaeolithic assemblage, unfortunately published globally as a unit, contains many Azilian points, backed bladelets and endscrapers, but relatively few burins. Level BIII from a pit dug in the cave interior, where very few artifacts were found, has been dated (on bone) to $11,840 \pm 240$ B.P. (Ly-1400) and $\geq 10,940$ B.P. (Ly-1458), but the relationship between it and Level II in the cave entrance is unknown. It too is called 'Azilian' by the excavator, Barandiarán (in Evin *et al.*, 1979: p. 442). The dates for Zatoya Level BIII and II-lower would be the oldest ones for the Azilian from the Vasco-Cantabrian region (with the exception of the two Ekain dates which are far out of stratigraphic order and therefore rejected by the excavators). The date for Level II-upper is, on the contrary, quite young. There is clearly an hiatus in sedimentation between the top of Level II and the lower part. The Level II fauna includes red deer, ibex, chamois and boar; the former two species are represented by especially many young individuals (Barandiarán, 1977), as is the case in the Azilian of La Riera. It would seem likely that all or part of Level II is Azilian, but there are no other published data which might help resolve the problem of its age, which by its dates would span the period from Allerød to Boreal.

3.7. Abauntz (Arrais, Navarra)

Recently a single ^{14}C date (on bone) of $9,530 \pm 300$ B.P. (Ly-1964) has been published for Level 'd' of Abauntz Cave, located at c. 700 m above sea level in northern Navarra near the Cantabro-Pyrenean watershed-like Zatoya in the Ebro basin (Evin *et al.*, 1983: p. 113; Utrilla, 1982). The associated industry is described as 'Azilian (Epipalaeolithic) without geometrics'.

Level 'd' is 10-25 cm thick. It contains *Helix* shells and 76 stone tools 14.4% endscrapers, 6.5% burins, 2.6% perforators, 2.6% Azilian points, and 34.2% backed bladelets. There are no harpoons. The fauna includes 2 MNI each of *Cervus* and *Capra* and one each of Bovini and *Rupicapra*, plus a fish bone (Altuna & Mariez-kurrena, 1982). The arboreal pollen percentage ranges from c. 60-c. 98%, with small percentages of hazel, beech, alder and oak, together with dominant pine. High humidity is indicated for this early Holocene level by a massive increase in fern spores *vis à vis* the underlying Magdalenian (Lopez, 1982).³

4. THE SITES OF GASCONY (PYRÉNÉES-ATLANTIQUES & LES LANDES)

4.1. Isturitz (Isturitz and Saint-Martin, Pyrénées-Atlantiques)

Isturitz is a huge cave system formed by the Arbéroue river which has successively cut three tunnels through a ridge near the boundary of the French Basque provinces of Labourd and Basse-Navarre. The uppermost tunnel, formed by the Salles d'Isturitz (Grande Salle) and Saint-Martin, contains a long Middle and Upper Palaeolithic stratigraphic sequence excavated first by Passermard and then by the Comte and Comtesse de Saint-Périer. The Azilian is represented by two flat-section harpoons found by R. de Saint-Périer (1936: pp. 37-38) in the top of Level Ia in the Salle d'Isturitz. Two cylindrical-section Upper Magdalenian harpoons were found in the lower part of this same pocket of jet black sediments, which measured 5 m in horizontal extension and 20 cm in thickness and which locally overlay Level I. A third Azilian harpoon was found in a silt lens similarly sandwiched between the flowstone and Level I in the Grande Salle.

Two pollen samples were taken from Level I: the uppermost one from right below and in contact with the capping stalagmitic crust and the lower one from a few centimeters below (Leroi-Gourhan, 1959). Both samples are assigned to the 'Upper Magdalenian', but the stratigraphic relationship between them and the possible Azilian lens (which is not mentioned by Leroi-Gourhan) is not known. Logically the uppermost pollen sample could correspond to the Azilian lens right below the flowstone, at the top of Level I, but this is not known. Both samples have an AP of c. 1% (with just a little pine) and high percentages of *Cichorieae*. Leroi-Gourhan stresses the great cold (albeit with humidity) indicated by these pollen spectra, although she does not suggest a chronological assignment for Level I at Isturitz. Clearly either Dryas II or III are the possibilities, and the capping-stalagmitic crust (post-Azilian) would consequently be either Allerød or Preboreal. There are no radiocarbon dates from Isturitz.

4.2. Abri Duruthy (Sorde-l'Abbaye, Landes)

In 1874, before the discovery of the Azilian by Piette at Mas d'Azil, Lartet and Chaplain-Duparc uncovered a deposit lying below a Chalcolithic

layer and atop the great Upper Magdalenian cobble pavements in the rock shelter of Duruthy. This vast site (like Dufaure, Grand Pastou and Petit Pastou) is located at the foot of the south-southwest facing Pastou Cliff, overlooking the Gave d'Oloron near its confluence with the Gave de Pau. The Basque Pyrenees lie within view to the south. The early excavators, who found a reindeer mandible in this deposit (their Level F'), noted the existence of a layer of *Helix* shells between the Upper Magdalenian pavement and Level F' (Arambourou, 1978). No mention is made of any flat-section harpoons.

Beginning in 1957, R. Arambourou has been excavating Duruthy. Only a small part of Level F' (Arambourou's Couche 2) remained at the very base of the cliff; it does not extend out into the slope and lower terrace, as does the Magdalenian VI stratum. Arambourou was able to distinguish two sublevels within Couche 2. F. Delpech (1983: pp. 112, 381) claims that the relative proportion of *Rangifer* decreased between the two sublevels, since the lower contained 5 reindeer remains (out of a total of 15 ungulate remains), whereas the upper contained 2 (out of a total of 14—including one each of boar and roe deer). Statistical analysis does not confirm the significance of this observation. Arambourou, like his predecessors, has found no flat-section harpoons. The Stratum 2 lithic assemblage includes 106 tools: 40.6% endscrapers, 18.9% burins, 8.5% backed bladelets and 5.6% Azilian points. The sedimentological analysis of C. Thibault (1978) also divides Stratum 2 into two subunits: the older formed under cool, humid conditions corresponding to Dryas III and the more recent under warmer, humid conditions corresponding to the beginning of the Post-Glacial. There is a sedimentary hiatus between Strata 3 (Magdalenian VI) and 2; this was probably brief, since Stratum 3, with evidence of temperate, very humid conditions (high AP, with thermophile and hygrophile taxa of both trees and herbs) is assigned to Allerød. The three phases of Allerød (the most recent of which—the thermal maximum—is truncated by erosion) are represented by the pollen of Stratum 3, whereas the lower part of Stratum 2 shows a decline in the AP (particularly in oak, hazel and alder), with a relative increase in pine and birch. Hygrophiles are still present despite the colder climate attributed by Paquereau (1978) to Dryas III. Reforestation was rapid in the upper part of Stratum 2, with a wide variety of thermophile taxa. This is interpreted as the beginning of the Post-Glacial. These interpretations are supported by the geological evidence

(Thibault, 1978). It should be added that while itself undated, Duruthy Stratum 2 overlies Stratum 3 the top of which is radiocarbon dated (on bone) to $11,150 \pm 220$ B.P. (Ly-919) and the base of which is dated by thermoluminescence to 11,300 B.P. (c. 10%) (BOR-6). These dates correspond in fact to the accepted range for Allerød. Stratum 2 is thus considerably younger, especially given the stratigraphic hiatus between the two levels noted above. Several lines of evidence also point to the existence of a Dryas III-Preboreal Azilian at the nearby site of Abri Dufaure.

4.3. Abri Dufaure (Sorde-l'Abbaye, Landes)

This site, located 230 m to the east of Duruthy at the base of the Pastou Cliff, consists of a small rockshelter, a narrow terrace in front thereof, and a steep talus slope which descends to the early Würm fluvial terrace of the Gave d'Oloron. In reality Duruthy, Dufaure and the two sites which lie between them, le Grand and le Petit Pastou, can be considered to be individual loci of one large Tardiglacial station. The Dufaure rockshelter was entirely excavated in one week in 1900 by H. Breuil and P. Dubalen. Despite some Post-Glacial disturbance of the surface deposits, they found materials which would today be labelled as 'Azilian' *in situ* amidst blocs and yellowish 'clays' (*foyer supérieur*). Among their finds was a flat-section harpoon fragment and a couple each of possibly painted and engraved cobbles. Small endscrapers were numerous, but burins few. They also found many backed bladelets despite the early date and obvious haste of the excavation. The *foyer supérieur* overlay a cobblestone pavement which capped the so-called *foyer inférieur*, with six cylindrical-section harpoon fragments. This deposit also contained many more endscrapers than burins, as well as many backed bladelets, according to Breuil and Dubalen (1901).

As a consequence of the results obtained in test trenches dug on the terrace in 1980 by L.G. Straus, large-scale excavations were begun at Dufaure in 1981. Beneath a superficial layer of humus and old backdirt (Stratum 1), an *éboulis* cone (Stratum 3) was uncovered on the terrace adjacent to the edge of the Breuil/Dubalen excavation. This rockfall deposit, probably equivalent to the blocs and *foyer supérieur* of Breuil and Dubalen, overlies a series of up to 9 cobblestone pavement layers (Stratum 4 = *foyer inférieur*). The top of Stratum 4 has been radiocarbon dated (on bone) to $10,910 \pm 220$ B.P. (Ly-2666). The middle dates to $11,750 \pm 300$ B.P.

(Ly-3181) and $12,030 \pm 280$ B.P. (Ly-3245), and the base dates to $12,260 \pm 400$ B.P. (Ly-3182). Level 3 is dated to $9,600 \pm 290$ B.P. (Ly-4224) and $10,310 \pm 270$ B.P. (Ly-4223). Stratum 4 has yielded an abundant lithic assemblage in which there are 12.8% burins, 9.2% endscrapers and 47.8% backed bladelets (including c. 1% Azilian points). There are a few geometric microliths and a Hamburgian point. There are also over two dozen antler *sagaie* fragments, a whole cylindrical section unilaterally barbed harpoon, two harpoon base fragments and a possible tip fragment. The fauna includes reindeer, horse, bovines and some red deer. Palynological analysis of Stratum 4 by M.M. Paquereau (n.d.) reveals evidence of the three known phases of Allerød, the last of which, with an AP of up to 53%, constituted a temperate, humid climatic maximum. The lower part of Stratum 3, however, registers a notable decline in the AP (28%), with pines and birches displacing the thermophile taxa present in Stratum 4. The thermophiles increase once again in the upper part of Stratum 3. The colder, drier episode which caused the Stratum 3 rockfall probably corresponds to Dryas III, like Couche 2 at Duruthy. Stratum 3 may contain at least two lenses of residues from apparently ephemeral human occupations, with a possible cobblestone pavement remnant in the squares closest to the *abri*. These lenses seem to be separated by a rockfall episode, while other such episodes within Stratum 3 overlie the topmost Stratum 4 pavement and directly underlie the Stratum 2 silt. Nearly 9,000 items of knapping debris have been found in all of Stratum 3, together with only 272 retouched stone tools, giving a debris/tools ratio of 32:1 versus 19:1 for Stratum 4. Virtually no bone tools have been found, and although faunal remains are preserved, they are highly fragmented. Definite identifications by J. Altuna and A. Spiess confirm the presence of reindeer here as in Duruthy Couche 2. Small amounts of *Rangifer* remains are distributed throughout all of Stratum 3. Endscrapers (14.7%) outnumber burins (11.4%), while over half the tools (51.5%) are backed bladelets. There are 5.5% Azilian points, two worn ochre pebbles, and an engraved pebble like one found in Duruthy Couche 2.

A trench dug in 1981-84 connects the block excavation on the terrace with the area dug in 1900 in the *abri*. A physical correlation between the *foyer supérieur* and Stratum 3 and between the *foyer inférieur* and Stratum 4 is apparent. Logically, therefore, the Stratum 3 assemblage should be assigned by definition to the Azilian (due to the

1900 find of a flat-section harpoon) and Stratum 4 to the Upper Magdalenian (due to the finds of cylindrical-section harpoons in both the old and new excavations), despite some general resemblances between the lithic assemblages of the two levels already noted in 1901 by Breuil and Dubalen. Stratum 3 would date to Dryas III (Straus, 1983).

4.4. Poeymaü (Arudy, Pyrénées-Atlantiques)

Another Gascon site with Azilian deposits which has been excavated fairly recently is Poeymaü in Arudy, in the Béarn sector of Pyrénées-Atlantiques. Unfortunately the excavations of G. Laplace have to date only been published in very preliminary fashion (Laplace, 1953). However, according to brief summaries given by Bordes (1972), Evin (1979) and J.P. Rigaud (1980), the main Azilian level ('CPE' or *couche à petits éléments*), with a ^{14}C date on bone of $11,540 \pm 220$ B.P. (Ly-1385) and consisting of gravels, sands and clays, is assigned to Allerød. It overlies the Terminal Magdalenian level (BI), which dates on bone to $12,000 \pm 250$ B.P. (Ly-1384) and consists of a rockfall attributed to 'older Dryas'. Azilian or 'Azilo-Sauveterrian' elements were also found amidst blocs of an overlying stratum (BS) dated on bone to $10,420 \pm 230$ B.P. (Ly-1386) and assigned to Dryas III. This level is in turn overlain by a stalagmitic layer attributed to Preboreal, above which were deposited a long series of so-called 'Aziloid' and 'Sauveterroid' (or 'Sauveterro-Arudian') *Helix* shell middens with geometric microliths of early Holocene age, the lowest of which (*foyers inférieurs à Helix*) have been ^{14}C dated to $9,960 \pm 210$ B.P. (Ly-1379, charcoal), $9,470 \pm 220$ B.P. (Ly-1380, charcoal), $9,430 \pm 210$ B.P. (Ly-1387, bone) and possibly $9,400 \pm 420$ B.P. (Ly-1388, bone). There are also three dates on land snails for stratum FIH: $10,250 \pm 240$ B.P. (Ly-1790), $10,700 \pm 290$ B.P. (Ly-1789) and $10,300 \pm 250$ B.P. (Ly-1788). Evin *et al.* (1980) judge these dates to be about 1000 years too old.

The nearby site of Espalungue in Arudy yielded perforated flat-section red deer antler harpoons to E. Piette in his Level F, which overlies a series of four Magdalenian strata. Level F is very tentatively attributed to Allerød by G. Marsan (1979) on *typological* grounds only. A possible Azilian at Tute de Carrelor in Lurbe is also essentially undated.

While not entirely satisfactory, the *corpus* of data from Vasco-Cantabrian Spain and Gascony clearly suggests that the tendency to globally assign the regional Azilian to the Allerød oscillation on the

basis of fundamentally extrapolative palynological interpretations exaggerates its age by at least one or two millennia. Most of the existing radiocarbon dates and sedimentological analyses point to a Dryas III age, with a few levels (Los Azules 3-upper and 2, Cueva Oscura de Ania, Abauntz d, Ekain IV, Dufaure 3-upper and possibly Arenaza II) pertaining to the Preboreal, and only Poeymaü 'CPE' clearly dating to Allerød. This evidence calls for a re-interpretation of the significance of the palynological results, since the entire Tardiglacial period was quite humid in Cantabrian Spain, and the Dryas III cooling may have had a much more attenuated impact on the vegetation in this southerly, hilly, coastal region than further north in the flatter interior of France, where there would have been fewer possibilities for thermophile and hygrophile taxa to find appropriate refugia during this brief period of climatic deterioration.⁴ While the 'facts' of the pollen analyses for Cantabrian Spain (*i.e.* the presence of specific taxa) are not called into question (although the sample sizes are often very small and the possibilities for percolation from overlying levels often great), it is the chronological significance attributed to often slight fluctuations in percentages or to 'indicator' taxa which must be treated with caution. In summary, the bulk of the data from Vasco-Cantabrian Spain and Gascony suggest that classic Azilian industries there date to the period of transition between Pleistocene and Holocene, as generally defined by the Dryas III-Preboreal boundary.

5. THE SITES OF THE CENTRAL PYRENEES (ARIÈGE & HAUTE GARONNE)

The Azilian chronology of the Vasco-Cantabrian region can be compared to the evidence from the Central Pyrenees, the region in which the Azilian was first defined and where the site of La Vache, key pollen sequence for the current standard chronological assignment of the Azilian, is located. Dating means in the Pyrenees (and Languedoc) can be classified thus:

Geological and/or palynological dating of secure Azilian: Mas d'Azil, Rhodes II, La Tourasse, Adaouste.

Terminus post quem radiocarbon dating of secure Azilian: La Vache, La Salpêtrière.

Direct radiocarbon dating of possible Azilian: Gazel, Chinchon.

5.1. La Vache (Alliat, Ariège)

The cave of La Vache is located at an elevation of about 550 m in the Vicdessos valley of the Ariège Pyrenees. It consists of a large vestibule ('la Salle Garrigou') first excavated in the latter half of the 19th century and then again in the mid-20th century, and an interior chamber ('la Salle Monique'), discovered and excavated by R. Robert during the middle years of this century. While the results of the recent excavations have never been comprehensively published, there have been numerous articles on the bone and lithic industries, fauna and pollen of La Vache in *Bulletin de la Société Préhistorique de l'Ariège* over the past three decades. In both *Salles* a thick, extremely rich cultural deposit assigned to the Upper/Final Magdalenian is overlain by a potent flowstone layer; this basic stratigraphic fact underlies all interpretations of the La Vache sequence. La Vache is one of the key sites for understanding and dating the relationship between the 'Upper Magdalenian' and the 'Azilian' and its sequence has been used to 'date' Azilian levels throughout the Vasco-Cantabrian region in particular (despite the physical distance and topographical differences involved).

There are three charcoal radiocarbon dates from the archaeological horizon (artificially divided into four levels all assigned to the Upper/Final Magdalenian) in 'la Salle Monique': 12,850±60 B.P. (GrN-2026) for basal Level 4, 12,540±105 B.P. (GrN-2025) and 11,650±200 B.P. (L-336c) for Level 2. The latter date is rejected by Arlette Leroi-Gourhan (1967) 'because it does not fit with the results of her palynological analysis' (Schmider, 1978: p. 15, fn. 5). Associated with abundant, diversified Magdalenian lithic assemblages and cylindrical harpoons (only uniserially barbed in uppermost Level 1 and biserially barbed in the lower levels) and sealed below the flowstone are eleven flat-section Azilian-type harpoons (Nougier & Robert, 1977). The combined Salle Monique lithic assemblage contains many backed bladelets but only low percentages of Azilian points (0.80%), thumbnail scrapers (0.67%) and geometric micro-liths (0.25%), although (as in several other Pyrenean 'Upper Magdalenian' sites) burins do not outnumber endscrapers (Schmider, 1978). The same is true of the Salle Garrigou assemblage from the cultural horizon underlying the flowstone; supposed Azilian lithic types are present but relatively scarce, as is true of many Upper Magdalenian assemblages. No cultural materials have been found within the stalagmitic layer in 'la Salle Monique',

however a lens within it in 'la Salle Garrigou' contained six flat-section harpoons, along with Azilian points and thumbnail scrapers (Nougier & Robert, 1977). This pocket, clearly above the 'Magdalenian' horizon, lacks cylindrical section harpoons and has been labelled 'Proto-Azilian', although it is apparently more recent than the Salle Monique horizon containing both Azilian and Magdalenian harpoons and although its own harpoons are fully 'Azilian' in morphology. Only Upper Magdalenian-type harpoons were found in the cultural layer underlying the flowstone in 'la Salle Garrigou'.

Archaeological Levels 4-2 in 'La Salle Monique', with very few arboreal pollen (mostly of pine) are assigned to Bølling by Leroi-Gourhan (1967), while archaeological Level 1, with a similarly low AP (c. 10%) but showing a replacement of *Graminae* by *Cichorieae* indicating drier conditions, is assigned to Dryas II. Consequently the overlying stalagmitic layer is palynologically attributed to Allerød. It contains high albeit variable (c. 20-50%) arboreal pollen percentages, composed of a variety of genera, notably *Corylus*, *Tilia*, *Quercus*, *Betula*, *Ulmus* and *Alnus*, as well as the ubiquitous *Pinus*. While there is clear evidence that the flowstone represents a very temperate, humid climatic phase, its dating relies partly on acceptance of the two 'older' Groningen dates and the rejection of the 'younger' Lamont date (of Allerød age) for Level 2 of the underlying archaeological horizon in 'la Salle Monique'. Thus an alternate interpretation of the ¹⁴C dates *per se* could lead to an initial Holocene assignment of the stalagmitic layer, with the underlying cultural horizon pertaining to Dryas III (Level 1) and Allerød (Levels 2-4).

The coexistence of Azilian and Magdalenian-type harpoons throughout the Salle Monique archaeological horizon would indicate either significant mixture of once separate assemblages or the arbitrariness (or even illegitimacy) of the classificatory distinction between these two culture-stratigraphic units, which is the viewpoint defended by Nougier and Robert (1977). Taken at face value, however, the La Vache evidence would seem to indicate an early appearance of Azilian-type harpoons, at least at this particular locality. The two harpoon types also appear together at a much later date, however, at Le Morin in Gironde (see below).

5.2. Rhodes II (Arignac, Ariège)

The Rhodes II rockshelter is located less than 5 km downstream from La Vache above the west bank of

the Ariège River. Like La Vache, Rhodes II contains a stratigraphic sequence which documents the Magdalenian-Azilian 'transition' in the Central Pyrenees (Clottes & Simmonet, 1979). 'Foyers' 1-4 of 'Couche' 2 are considered to be typical Upper Magdalenian in assemblage composition, but the lithic assemblages of 'Foyers' 5 & 6 show changes in the Azilian 'direction' both in terms of particular types and lithic raw materials present. There are, however, no harpoons. 'Foyer' 7 has a typical Azilian assemblage, with several flat-section harpoons. According to the palynological analysis of M. Girard, the Allerød oscillation began with Foyer 4, being preceded by Dryas II in Foyer 3 and Bølling in Foyers 1 and 2. The temperate, humid Allerød conditions of Foyers 4-6 ended in Foyer 7 times with a colder episode attributed to Dryas III (Simmonet, 1983; 1976). A faunal change began in Foyer 5, with increasing quantities of red deer, roe deer and boar, which replaced such 'cold' forms as reindeer, *Lagopus* sp. and the Nordic vole.

The base of Foyer 6 was radiocarbon dated (on charcoal): 12,100±150 B.P. (MC-997) and Foyer 5: 12,160±160 B.P. (Gif-2258), 12,250±200 B.P. (MC-1366) and 12,300±150 B.P. (MC-996). These dates are older than the age generally accepted for mid to late Allerød, although at minus 2 s.d. they could fit into the traditional scheme. In addition they are a bit too young to pertain to Bølling. If the culturally 'transitional' Foyers 5-6 at Rhodes II are accepted as being Allerød in age, it could be asked why the same could not be true of the culturally 'transitional' stratum underlying the flowstone at La Vache with its similar ¹⁴C dates. The comparison of the neighboring La Vache and Rhodes II chronostratigraphies raises the question of the identity and synchrony of Tardiglacial climatic oscillations such as the Allerød in Northwest Europe, West-central France and the Pyrenean region.

5.3. Mas d'Azil (Mas d'Azil, Ariège)

Little hard evidence exists for the dating of the Azilian at the type site of le Mas d'Azil, a huge cave in the Pyrenean foothills of western Ariège. Azilian deposits were excavated by Piette, Péquart and others on both banks of the Arize River's passage through the cave, yielding vast quantities of the classic Azilian flat section harpoons, painted cobbles and lithic artifacts. They found extremely rich Magdalenian deposits as well. More recent excavations in this exceptionally complex site are as yet unpublished. Sedimentological and palynological

analyses were however recently conducted on samples which Piette had collected at the 'Left Bank' locus nearly a century ago and which were preserved at the Musée des Antiquités Nationales in Saint-Germain-en-Laye (Girard, Moser & Orliac, 1979). These samples, which could be correlated with Piette's published stratigraphy (still visible today), suggest that the Azilian sequence at Mas d'Azil began at the end of Dryas III. The corresponding sample is highly enriched in coarse sands and contains few arboreal pollen, almost none of which are of thermophile taxa. An open, steppelike vegetation seems to have characterized the beginning of Piette's Azilian ('Couche F'), as well as the Terminal Magdalenian which underlay it on the Left Bank. (Azilian 'Couche F' yielded the last reindeer remains in the Mas d'Azil sequence (Bahn, 1984: p. 398)). These conditions ended abruptly and were followed by an explosive increase in arboreal vegetation (AP: c. 50-80%), with a wide variety of thermophile taxa indicative of the Preboreal, Boreal and early Atlantic phases of the Holocene. Naturally these results should be interpreted with caution, but they would seem to point to a late age for the Azilian at the type site. Piette's overlying 'Arisian' levels with flat-section harpoons (= Later Azilian, 'Couche G') are clearly Postglacial in age and environmental characteristics.

5.4. La Tourasse (Saint-Martory, Haute-Garonne)

Like Mas d'Azil, the other Azilian type site, La Tourasse, has recently been re-analyzed. It is a cave and rockshelter located near the confluence of the Garonne and Salat rivers, 35 km west-northwest of Mas d'Azil. First dug in the 1890's, La Tourasse yielded industries (which included flat-section harpoons), labelled 'Tourassian' at the time, which like the 'Azilian'/'Arisian' were thought to fill the 'hiatus' between the Magdalenian and the Neolithic. The term 'Tourassian' was later dropped in favor of the 'Azilian'. The sequence at La Tourasse includes Terminal Magdalenian, Azilian, Mesolithic and ceramic-bearing levels. Excavations were started again in the 1970's at this classic site by E. and M. Orliac (1973). While ¹⁴C dates are not yet available, preliminary sedimentological analyses permit some initial hypotheses on the age of Tardiglacial and initial Postglacial deposits (Girard, Moser & Orliac, 1979). The Terminal Magdalenian (with reindeer) levels (E3-1) and the first Azilian levels (D11-6) were deposited under weakly oscillating climatic conditions tentatively attribu-

ted to Dryas II and Allerød, whereas the bulk of the levels reported by Girard *et al.* to be Azilian were formed under decidedly cold conditions rather speculatively attributed to Dryas III (Levels D5-2) and under dramatically warmer conditions assigned to Preboreal and early Boreal (C7-1). Girard, Moser and Orliac (1979) believe, therefore, that the Later Azilian ('Arisian') at Mas d'Azil and La Tourasse were contemporary, Postglacial phenomena. (Another parallel can be found in the 'Arudian' levels (*foyers inférieurs à Helix*) at Poeymaïti). The Azilian at the two classic type sites would thus have spanned the Pleistocene/Holocene boundary. R. Simmonet (1976: p. 1414) concludes his overview of the Pyrenean Epipalaeolithic by suggesting that the Azilian of this region may have been younger than once believed, extending through and even beyond the Preboreal, although having begun as early as the Allerød (at least at La Vache). This is the conclusion he reaches on the basis of the analyses of the stratigraphic sequences at Rhodes II, Mas d'Azil and La Tourasse.

The Central French Pyrenees contain a number of other sites with Azilian materials. They include Le Trou Violet near le Mas d'Azil, which, like it, contained some reindeer remains in an Early Azilian level (D) (Bahn, 1984: p. 396) and a possibly Azilian burial with associated red-painted pebbles (Sawtell & Treat, 1927), reminiscent of the burial found at Los Azules. The recent excavation of La Balma Margineda, at nearly 1000m in Andorra, has uncovered several Azilian strata (8-5). Painted and engraved pebbles have been found in Level 6 and basal Level 5. The two strata are placed palynologically in the Preboreal and early Boreal; basal Level 6 dates to $10,640 \pm 260$ B.P. (Ly-2843) and its top dates to $9,250 \pm 160$ B.P. (Ly-2842). Levels 7-8 may date to Dryas III. This was a specialized summer ibex-hunting site (Guilaine *et al.*, 1985).

6. THE SITES OF WESTERN LANGUEDOC

The easternmost site along the northern flank of the Pyrenees which can be assigned to the Azilian is La Crouzade, located in l'Aude to the southeast of Narbonne, very near the Mediterranean. Here, Level (4), which overlay an Upper Magdalenian deposit, contained at least a dozen painted pebbles (although it has yielded no harpoons) (Sacchi, 1976). La Petite Grotte de Bize, on a tributary of the Aude River north-northwest of Narbonne, has also produced an Azilian assemblage with a typical flat-

section harpoon and a painted pebble in a level immediately overlying an Upper Magdalenian sequence (Sacchi, 1976). We as yet lack chronological data which would permit placement of these Azilian levels in the Terminal Pleistocene/Initial Holocene chronostratigraphic framework. However, recent excavations by D. Sacchi (1976) at the cave of Gazel on another Aude tributary north of Carcassonne have produced a Terminal Magdalenian level (6) ^{14}C dated (on charcoal) to $10,760 \pm 190$ B.P. (Gif-2654), followed by a series of 'Epimagdalenian' levels (without Azilian harpoons or decorated pebbles), the lowest of which (5) is dated (on charcoal) to $10,080 \pm 190$ B.P. (Gif-2653)—right at the Dryas III/Preboreal boundary. These levels at Gazel have high percentages of Azilian points, with many backed bladelets, endscrapers (including thumbnail types), but relatively many geometrics only in the uppermost Level 3. Other sites in this region for which Azilian materials have been claimed include Balma Abeurador and La Grotte du Salpêtre de Pompignan, the latter of which has a date of $9,900 \pm 200$ B.P. (MC-2241) (Geddes *et al.*, 1986).

7. THE SITES OF EASTERN LANGUEDOC AND PROVENCE

Still further east and far from the Pyrenees, in the Vaucluse, there is an isolated Azilian level (A) at Chinchon. This level, which contained a typical flat-section harpoon, overlay a series of cryoclastic Upper Magdalenian levels (Livache, 1976: p. 1160) and has been ^{14}C dated to $8,980 \pm 850$ B.P. (Ly-598), although the humus sample is described as 'probably polluted' (Schvoerer *et al.*, 1979: p. 34). These same authors state that the level in question represents a 'cold climatic phase' (Dryas III?), but Escalon de Fonton *et al.* (1979: 275) place it within a humid phase they assign to Allerød. However the Chinchon Magdalenian VI has been dated (on bone) to $12,000 \pm 420$ B.P. (Ly-597). The Azilian *sensu stricto* is otherwise lacking in the Vaucluse, although there are other post-Magdalenian lithic industries similar to that of Chinchon Level A at sites like Soubeyras (*i.e.*, IG IB, presence of backed points and backed bladelets) (Livache, 1976: pp. 1160-1161; Escalon de Fonton *et al.*, 1979).

The only other known true Azilian deposits in eastern Languedoc and Provence were the ones uncovered in old excavations at Adaouste (Bouches-du-Rhône), Féraud and la Salpêtrière (Gard) for

which there are no absolute dates (Escalon de Fonton, 1976a; 1976b; Escalon de Fonton *et al.*, 1979). The Azilian layer at Adaouste apparently originally overlay a 'Magdalenian V' level (12) dated (on bone) to $12,280 \pm 190$ B.P. (Ly-541) from which it was separated by at least two (undated) 'Magdalenian VI' levels (11 and 10). The Adaouste 'Magdalenian VI' is believed to have been deposited during the Dryas II and eroded during Allerød (Escalon de Fonton & Onoradini, 1976; Escalon de Fonton *et al.*, 1979). The Salpêtrière Azilian was located in deposits with evidence of high humidity also assigned to Allerød. It follows a Terminal Magdalenian in cryoclastic sediments attributed to Dryas II (Escalon de Fonton & Bazile, 1976) (despite a ^{14}C date of $10,680 \pm 300$ B.P. (Ly-937), which would place it in Dryas III (Schvoerer *et al.*, 1979: p. 32)). At other sites in eastern Languedoc and in Provence the classic Azilian is replaced by the Valorguian (= Provençal Romanellian), a regional facies lacking harpoons and Azilian points and dated to the Allerød (Escalon de Fonton, 1976a; 1976b; Escalon de Fonton *et al.*, 1979).

The Azilian record from Vasco-Cantabrian Spain and extreme southern France can now be compared with the chronological evidence for the Azilian in the Périgord, Quercy and other regions further to the north and east in France. Due to the large number of Azilian sites in these regions, only those with radiocarbon dating will be discussed and evaluated at length.

8. SITES OF LE QUERCY (TARN, LOT AND LOT-ET-GARONNE)

8.1. Abri de la Tête du Chien (Penne, Tarn)

This rockshelter is adjacent to the cave of La Madeleine, a final Magdalenian with famous reclining female bas relief sculptures. Excavations in the early 1950's yielded an Azilian industry from a deposit which has recently been radiocarbon dated (on bone) to $10,110 \pm 440$ B.P. (Ly-1175) (Clottes, 1979: p. 666). This date clearly places the Tête du Chien Azilian in Dryas III or at the Dryas III/Pre-boreal limit.

8.2. La Borie del Rey (Sauveterre-la-Lemance, Lot-et-Garonne)

This site is one of a group of Terminal Pleistocene loci investigated beginning in the 1920's by L.

Coulonges and most recently by J.M. Le Tensorer (1976). Coulonges rejected the term 'Azilian' and used that of 'Laborian'. Le Tensorer (1979), while maintaining this term, has qualified the industries of Levels 3 and 4 at La Borie del Rey as Azilian in general characteristics; Azilian points (*sensu lato*) are very abundant, but burins—while few—out-number endscrapers. Level 3 has been dated (probably on bone collagen) to $10,400 \pm 230$ B.P. (Ly-1386) and $10,350 \pm 340$ B.P. (Ly-1401) and Level 4 to $9,870 \pm 320$ B.P. (Ly-1402) (Evin, 1979: p. 12). Thus, like La Tête du Chien in relatively closeby northern Tarn, the Borie del Rey Azilian straddles the Pleistocene/Holocene boundary. Le Tensorer (1979) assigns it to Dryas III specifically, on the basis of sedimentological evidence.

8.3. Pégourié (Caniac-du-Causse, Lot)

This cave has been under excavation for over 15 years by M.R. Séronie-Vivien (Séronie-Vivien & Le Tensorer, 1979; Séronie-Vivien *et al.*, 1981). It contains three chronologically isolated cultural units separated by occupational hiatus: Early/Mid Bronze Age, Azilian and Initial Magdalenian. The Magdalenian dates to about 17,400 B.P. and has faunal assemblages dominated by bovines and reindeer. Levels 7-4 are classified as Azilian, and indeed Level 4 contained three flat section harpoons. (An engraved pebble was also found, but out of stratigraphic context.) The assemblages of stone tools contain high percentages of short endscrapers, few burins and regular backed bladelets, and many Azilian points of a variety of sub-types. Sedimentological analysis shows the Azilian levels to have been deposited under cold/humid, warmer/drier, temperate/very humid and finally colder/drier conditions very tentatively attributed as an ensemble to the Allerød. The palynological analysis is based on four isolated samples from separate columns, the last of which has only a very small pollen sample. There is an apparently progressive increase in the AP, first with birches and then more thermophile species (plus ferns), although *Cichorieae* continue to outnumber *Graminae* throughout the Azilian levels. Levels 6-4 are assigned by Arlette Leroi-Gourhan to Allerød on the basis of the supposedly characteristic floral associations said to be reflected by the pollen spectra. However, given the discontinuous nature of the sampling and the very long hiatus between levels 8a and 7, this attribution may be at the least

quite risky. There are, however, 10 radiocarbon dates for the Azilian of Pégourié:

Level 4: 11,390±320 B.P. (Ly-1390, bone)

8,310±220 B.P. (Ly-1939, shell)

Level 5:

8,450±250 B.P. (Gif-2568, shell)

8,450±310 B.P. (Ly-1837, shell)

11,680±330 B.P. (Ly-1391, bone)

11,870±290 B.P. (Ly-1832, bone)

11,850±280 B.P. (Ly-1833, bone)

Level 5 base

12,690±530 B.P. (Ly-1392, bone)

Level 6:

8,730±890 B.P. (Ly-1393, bone)

Level 7:

12,250±350 B.P. (Gif-2822, charcoal)

The series of 'old' dates would support assignment of Levels 6-4 to Allerød (and Level 7 to Dryas II). The three shell dates are, however, on terrestrial gastropods (*Helix*), which are said to be good material for ^{14}C dating (unlike aquatic molluscs) (Evin, 1977: p. 136), so they, like the Level 6 bone collagen date must be explained away by mixing of the sediments (Séronie-Vivien *et al.*, 1981: p. 253). Similarly, the few reindeer bones (15) in Level 7 are said to be intrusive. The Azilian faunas are dominated by *Cervus elaphus*, *Sus scrofa* and *Oryctolagus cuniculus* (rabbit), whose remains (the source of ^{14}C date Ly-1833) number in the thousands and were systematically broken, charred and bear cut marks—all evidence of non-intrusiveness and definite human exploitation for food and/or skins. The Pégourié Azilian faunal assemblages also include smaller percentages of roe deer, horse and bovine remains, as well as fish.

The nearby collapsed cave of Les Fieux (Miers, Lot) contains a Mousterian and Early Upper Palaeolithic (Aurignacian and Gravettian) sequence and a Holocene sequence with Sauveterrian and Neolithic levels (Champagne & Jaubert, 1981). Between the two sequences lies a deposit (Level E) with an unusual lithic artifact assemblage labelled 'Epipalaeolithic' and said by the authors to resemble the Azilian assemblage from La Borie del Rey, despite a lack of thumbnail endscrapers and Azilian points at Les Fieux. But this is a rather specialized industry, with nearly 56% backed blades (plus 26.55% burins and only 2.6% endscrapers) among the 467 tools recovered to date. There are no harpoons. Bone is badly preserved, but a few remains of horse, bovines and reindeer

could be identified. Fragments of charcoal provided a radiocarbon date of 9,450±190 B.P. (Gif-1807) for the very base of Sauveterrian Level D-3 and a second Sauveterrian date of 9,060±190 B.P. (Gif-4281). Attribution of this assemblage is rather tenuous.

8.4. Abri de Graves (Léobard, Lot)

This single-component Azilian site, located WNW of Pégourié near the border of Dordogne, has been only briefly reported by J. Clottes (1979: pp. 640-641; 1983: p. 489). To date the abundant lithic industry is heavily dominated by Azilian points (of which there are 138!) and endscrapers (130). There are only a few other tools (including almost no burins), but debitage items are numerous. So far, two decorated cobbles have been found: one engraved and the other painted with ochre spots. No harpoons or other bone implements have been found, but there is a triturated fauna dominated by rabbits and red deer. Spit b of the 70 cm thick Azilian layer has been radiocarbon dated (on bone) to 9,900±180 B.P. (Gif-5318) (Clottes, 1983: p. 489), which would place this occupation in the Preboreal.

One final site in Lot may shed some light on the age of the Azilian (and on the ambiguity of its temporal and compositional differences from the Terminal Magdalenian): Sainte-Eulalie in Espagnac (Lorblanchet, 1976a: p. 1193; Schvoerer *et al.*, 1979: p. 31). Level I in this cave contains classic, rich 'Magdalenian VI' artifact assemblages, including several cylindrical-section, biserially barbed harpoons. It has two radiocarbon dates on bone: 10,830±200 B.P. (Gif-1697) and 10,400±300 B.P. (Gif-2193), would place it in Dryas III and make the Magdalenian here more recent than the Azilian at nearby Pégourié. While less abundant than in the underlying Middle Magdalenian levels, reindeer still makes up nearly 59% of the faunal remains in Level I. As along the flanks of the Pyrenees (Dufaure and Duruthy), *Rangifer* seems to have survived into the Dryas III to be hunted here by people with Magdalenian equipment in northern Quercy on the flanks of the Massif Central. Lorblanchet (1976b: p. 1398) hypothesizes contemporaneity between Late Magdalenian and Azilian 'groups' (or, should we say, 'technologies'). At the rock-shelter Coronzac-vers-Lot, in fact, he has found an assemblage combining Magdalenian and Azilian traits (the later including a flat-section harpoon bearing Magdalenian-type inci-

sions along the shaft). Among the various types of undated Azilian assemblages in Lot is one without harpoons but containing painted and engraved pebbles, many endscrapers and Azilian points, and few burins or backed bladelets, at Abri Pagès in Rocamadour, very near Pégourié (Lorblanchet, 1976b: p. 1398).

9. SITES IN THE PÉRIGORD (DORDOGNE)

9.1. La Faurélie II (Mauzens-Miremont, Dordogne)

While one of the classic Azilian sites, Villepin (with deposits horizontally contiguous and temporally subsequent to the type Magdalenian IV-VI sequence at La Madeleine), is located in the Périgord, this important prehistoric culture area has only one Azilian site with radiocarbon dates, Le Pont d'Ambon, dug recently by G. Célérier (1976). The site of La Faurélie, near Les Eyzies, however, has a sequence of Upper Magdalenian levels surmounted by an undated Azilian level (2), from which they are, in some parts of the site, separated by a sterile layer. The 'Terminal Magdalenian' of Level 5 (well below the Azilian) is dated to $11,780 \pm 180$ B.P. (Gif-364—on bone) (Schvoerer *et al.*, 1979: p. 30; Laville *et al.*, 1980: p. 326). Sedimentological analyses show La Faurélie Level 5 (+ lower Level 4) to have been laid down under mild/humid conditions of 'Würm IV, phase 8' (= Allerød), upper Level 4 under colder/drier conditions of 'phase 9' (= Dryas III) and Level 2 under temperate conditions of early post-Pleistocene (= Preboreal) times (Laville *et al.*, 1980: pp. 312, 326-29). Interestingly, like at Pégourié, Level 2 contains huge quantities of rabbit remains, plus a few of reindeer (Laville *et al.*, 1980; Célérier, 1976).

There are two other sites from Guyenne which add some indirect information on the age of the Azilian in this region: Le Morin shelter (Gensac, Gironde), and Gare de Couze (Lalinde, Dordogne). 'Magdalenian VI' deposits (exact level unknown) were dated (on bone) at Morin to $10,480 \pm 200$ B.P. (Gif-2105) and at Couze to $10,900 \pm 230$ B.P. (Lv-391) (Schvoerer *et al.*, 1979: p. 29). (Level C at Couze 'Magdalenian IV' has specifically been dated to $11,750 \pm 310$ B.P. (Ly-976) and Level H 'Magdalenian V-VI'). Both sites' assemblages are characterized as being very final Magdalenian, with many short endscrapers and Azilian points, although Couze has very high microlithic indices (backed bladelets) and Morin has much lower ones

(though both were modern excavations). Both sites have biserially barbed cylindrical-section harpoons, but Morin has four flat-section ones as well in its uppermost levels (A III-I) (along with 31 of the 'Magdalenian VI' traditional type and Magdalenian harpoons alone in underlying Levels BII, BI & AIV) (Bordes & De Sonneville-Bordes, 1979). The top of the Morin sequence (AII-I) is marked by sedimentological evidence for a brief, moderately cold period, with a slight increase in the percentage of reindeer remains, while *Rangifer* dominates the whole Couze sequence, despite generally temperate, humid conditions (Bordes and De Sonneville-Bordes, 1979: p. 450). The Gare de Couze Terminal Magdalenian (Levels G-B) is placed within 'Würm IV, phase 8' (= Allerød) by Laville *et al.* (1980: p. 312). Conceivably, the top of the Morin sequence lies in the Dryas III as hypothesized by Delpech (1983: p. 294), and could theoretically have included an Azilian deposit perhaps mixed with the Terminal Magdalenian. Both these sites suggest that the Magdalenian/Azilian 'transition' took place in Dryas III and tend to corroborate the Preboreal date of the Faurélie Azilian.

9.2. Le Pont d'Ambon (Bourdeilles, Dordogne)

This is a small rockshelter in the northern ('White') Périgord. It has a series of Late Magdalenian levels, the uppermost of which (4 & 3b) date to $12,840 \pm 220$ B.P. (Gif-3369) and $12,130 \pm 160$ B.P. (Gif-3739). Level 3b has large numbers of 'Azilian elements', according to its excavator, Célérier (1976: p. 1429). The first level classified as 'Azilian' (meaning here that there are many morphologically variable Azilian points, short endscrapers, few burins and few backed bladelets or geometrics) (Level 3a), dates (on bone) to $9,830 \pm 130$ B.P. (Gif-2570). Level 3 (above 3a) dates (on bone) to $9,990 \pm 250$ B.P. (Gif-3561) and, on a sample described by the authors as 'organic matter' to $10,350 \pm 190$ B.P. (Gif-3368) (Schvoerer *et al.*, 1979: p. 30). (Taking standard deviations into account, the Level 3 dates overlap and the Level 3a date could actually be older than them, despite the apparent chronological inversion of the means.) Level 2, the only one at Pont d'Ambon to contain a flat-section harpoon, dates (on bone) to $9,640 \pm 120$ B.P. (Gif-3740).

On the basis of both sedimentological and palynological analyses, upper Level 4 and Level 3b are said to be relatively cold and dry, Level 3a temperate/humid, Level 3 colder/drier and Level 2 temperate/humid (Célérier, 1976: p. 1431; Laville

et al., 1980: pp. 335-37). Despite the evidence of significant environmental change, the faunal assemblages are essentially the same and 'temperate' in character throughout. There are no reindeer. Red deer make up about 80% of the ungulate remains in Levels 3a and 3, but only 37% in Level 2 (where there are more horses and bovines). Roe deer and boar are also present, while there are large quantities of rabbit and fish bones as well. The faunal analysis (by F. Delpech) would place the whole sequence within the early Holocene (plus Dryas III), which jibes with the radiocarbon dates. However, the sedimentological and palynological analyses, rejecting the dates from Levels 3 and 3a, attribute the latter level to 'Würm IV, phase 8' (= Allerød) and the former to 'phase 9' (= Dryas III). In this scheme, at least Level 2 would be post-Pleistocene (Preboreal) (Laville *et al.*, 1980: p. 312; Célérier, 1976: p. 1431). If not entirely Holocene in age, the Pont d'Ambon Azilian straddles the Pleistocene/Holocene boundary.

10. SITES IN LIMOUSIN AND POITOU (CORRÈZE AND VIENNE)

There are no dated Azilian sites in the Charentes and only one each in Corrèze and Vienne, both *départements* which lie to the north of the Dordogne.

10.1. Chez Jugie (Cosnac, Corrèze)

This rockshelter, right near the Dordogne border and not far from Le Pont d'Ambon, has been excavated recently by G. Mazière and J.P. Raynal. Here an Azilian deposit (Level 5) lies between a sterile layer (6) and a series of Sauveterrian levels (2-3), the latter dating to 7,000-8,000 B.P. Level 4, which lies between the Azilian and the earliest Sauveterrian, is sterile (Mazière & Tixier, 1976: p. 1441). Charcoal samples from Level 5 gave results of $11,840 \pm 580$ B.P. (Ly-1572) and $11,730 \pm 530$ B.P. (Ly-1601), dates which are considered satisfactory 'despite difficulties of measurement and risk of contamination' by 'roots, rootlets and burrows' in sandy sediments with high acidity (Evin *et al.*, 1979: pp. 440-441). These dates would place the Chez Jugie Azilian in the early Allerød. Its lithic assemblage is 50% Azilian points, 33% endscrapers (mostly short) and little else (only 1.5% burins). No bone or bone tools are preserved (Mazière & Tixier, 1976: p. 1443; Mazière & Raynal, 1979: pp. 512-

513). An Azilian industry is also present in another site in the Brive basin, Chez Bonny, but it is undated.

10.2. La Grotte du Bois Ragot (Gouex, Vienne)

Further north, this site is located near the famous Magdalenian mobile art site of La Marche. The Azilian sequence is underlain by a pair of final Magdalenian levels (6 & 5b), from which it is separated by sterile Levels 5a and 4c. These Magdalenian levels have cylindrical-section biserially barbed harpoons. Level 6 has been dated (on charcoal) to $10,180 \pm 160$ B.P. (Gif-3579). This date is said to be contaminated by rootlets by Chollet *et al.* (1979: p. 369, note 4), although such contamination is not noted by the radiocarbon analysts themselves (Schvoerer *et al.*, 1979: p. 29). According to Schvoerer *et al.* (1979: p. 29), Level 5b dates (on charcoal) to $10,030 \pm 140$ B.P. (Gif-2537), but according to Chollet *et al.* (1979: p. 369), the date should be $11,030 \pm 140$ B.P. Azilian Levels 4b and 3 date (on charcoal) to $10,990 \pm 160$ B.P. (Gif-3580) and 8800 ± 220 B.P. (Gif-1588) respectively. These two levels are separated by a thick, apparently archaeologically sterile layer (4a) composed of large rockfall blocks in a clay matrix.

The Level 4 lithic assemblage has high percentages of Azilian points and short endscrapers, and there are far fewer backed bladelets than in the Upper Magdalenian assemblages. Lacking harpoons, it has a curved bone fish hook. The Level 3 assemblage is poorer, but contains an even higher percentage (32.3%) of Azilian points, many short endscrapers and fewer burins. It contains two fish hook fragments, and indeed fish bones are abundant and pertain to many species in the two Azilian strata (much more so than in the Magdalenian ones) (Chollet *et al.*, 1979). There are also a few 'Azilian' engraved cobbles.

The ungulate faunas of Levels 5b and especially 6 are heavily dominated by *Rangifer* remains. The rodents are indicative of cold but increasingly humid conditions. Snowy owl and arctic hare remains are also abundant in Level 5b and may be further evidence of cold, humid conditions (Chollet *et al.*, 1979: p. 374). However, the sediments of Levels 6 and 5b are practically lacking in cryoclastic elements of the coarse and medium fractions. They are mostly silty, clayey sands. In contrast, Level 4 has evidence of cooler, drier conditions, with an increase in frost-weathering. Reindeer remains are still present, but red deer is the dominant ungulate

in Level 4b. Ironically, forest and waterside rodents increase in Level 4b, and boar and roe deer, which appeared in Level 5b, are also present. The coarse granulometric fraction is again practically absent in Level 3 and there are illuvial concretions. Reindeer is absent as is the tundra-dwelling arctic lemming (*Dicrostonyx torquatus*) which had been present before. In general, the rodents are temperate forest and waterside species. Red deer dominates the poor ungulate fauna (Chollet *et al.*, 1979). Given the problems of attempting broad climatic/chronostratigraphic correlations based on a site in a humid streamside microhabitat surrounded by upland plateaux, the authors do not propose phase assignments for their strata, although one hypothesis could attribute Levels 6 and 5b to Allerød, Level 4 (Azilian) to Dryas III and Level 3 to Preboreal. This hypothesis accommodates all the radiocarbon dates (especially when standard deviations are considered) except the one for Level 6, which is rejected by the excavator. Once again, then, the Azilian would straddle the boundary between Pleistocene and Holocene.

Two nearby Magdalenian deposits have radiocarbon dates placing them in Dryas III. That of Les Terriers in Lussac-les-Châteaux is $10,450 \pm 250$ B.P. (Gif-1128), while the 'Magdalenian V' of the famous site of Le Roc-aux-Sorciers at Angles-sur-l'Anglin dates to $10,840 \pm 120$ B.P. (GrN-2912). These dates help confirm the lateness of the Terminal Magdalenian and, consequently, Azilian in the Vienne, as in many areas to the south.

11. THE SITES OF THE RHÔNE-ALPES REGION

There are a number of deposits which have been attributed to the Azilian in East-central France which have been dated by radiocarbon. One of these, Le Saut du Loup, located in Ardèche, is rather isolated, although actually closer to the Vaucluse site of Chinchon than to the rest of the Azilian sites in the Rhône-Alpes region discussed here.

11.1. Le Saut du Loup (Bidon, Ardèche)

Also known as Abri Dumas, this site is one of a dense cluster of Pleistocene art and habitation loci along the gorge of the lower Ardèche river near its confluence with the Rhône. Dug in the early 1970's Saut du Loup has three cultural levels, all assigned to the Azilian, although no flat-section harpoons were found (as is frequently the case outside of the

Cantabrian and Pyrenean regions). Levels III and II have sedimentological evidence of cold conditions, as does Level I (Combier, 1977: p. 576). Level III has three radiocarbon dates: $12,080 \pm 310$ B.P. (Ly-319—on humus), $11,750 \pm 300$ B.P. (Ly-318—on charcoal) and $11,500 \pm 380$ B.P. (Ly-320—on bone) (Schvoerer *et al.*, 1979: p. 39). The latter two dates are considered more accurate. The faunas are dominated by rabbit remains, together with some red deer, boar and ibex. Levels III and II, in agreement with the radiocarbon dates, are believed to belong to a cold phase within Allerød and Level I to Dryas III. The lithic industries include many Azilian points and small endscrapers (Combier, 1977: p. 576).

11.2. Abri Jean Pierre I (Saint-Thibaud-de-Couz, Savoie)

This site (one of a pair of caves partly destroyed by a quarry before excavation) is located at 500 m above sea level on the western slope of the Chartreuse massif in very eastern France. It was dug in 1969-72 by P. Bintz and yielded a series of Terminal Magdalenian and Azilian assemblages, the latter equated by the excavator with the term 'Epipalaeolithic'. The radiocarbon dates for the Magdalenian range in age from about 13,000 to about 12,000 B.P. These levels (9 and 8) are assigned to Bølling and there is said to be a hiatus equivalent to Dryas II, just before the first occupations labelled as Azilian (Bintz, 1976; Bintz & Desbrosse, 1979). Conditions, based on sediments, macro- and microfauna, were quite rigorous. The Jean Pierre Azilian sequence begins with Level 7, dated to $11,900 \pm 360$ B.P. (Ly-429—on bone). This and Levels 6B and 6C (the latter dated on charcoal to $10,750 \pm 300$ B.P. (Ly-596)) are assigned to Allerød, as there is some palynological evidence of warming plus greater evidence from the rodents, birds and ungulates of increased forestation under more moderate climatic conditions, also testified to by the sediments. However, while the trend was generally toward more temperate, humid conditions, there were still strong, numerous episodes of freeze and thaw (Bintz & Desbrosse, 1979: p. 244). Level 6A (undated) shows a definite return to cold, steppic conditions, clearly apparent in the pollen, sediments and molluscan fauna. The site was little occupied at this time, presumably attributable to Dryas III. Level 5 had two Azilian occupations dated to $10,620 \pm 210$ (Ly-1190—on bone) (a date for 5C which does not correspond exactly with the one given by Schvoerer *et al.* (1979: p. 38), and

which is believed by Bintz and Desbrosse (1979: p. 244) to be a bit too old for this level) and $9,050 \pm 260$ B.P. (Ly-428—on bone) for 5A, whose scanty industry is tentatively called 'final Azilian' by the excavators. The pollen and sediments point to markedly warmer and more humid conditions for all of Level 5, assignable to Preboreal. The large mammals are dominated by ibex and marmot (understandable given the site's steep rocky surroundings), plus chamois, red deer and moose.

The lithic assemblages of Level 7—assigned to the 'Early Azilian'—and those of Levels 6–5C ('Middle' and 'Final Azilian') all have substantial percentages of Azilian points and backed bladelets. Small endscrapers and burins are, however, more numerous in Level 7 (with a nearly identical burin index in 'Magdalenian' Level 9). There are no harpoons, either of Magdalenian or Azilian type. The uppermost, 9,000-year old assemblage at Jean Pierre I is poor in tools and virtually lacking in Azilian points, though it has a high percentage of small endscrapers and relatively many backed bladelets (Bintz, 1976: p. 1405; Bintz & Desbrosse, 1979: p. 253). Its attribution is clearly problematical. Interestingly, this Preboreal level has domesticated dog remains. Industries partly similar to that of Jean Pierre Level 5A (labelled as 'Upper' or 'Final Azilian') have been found at the adjacent caves of La Passagère and Colomb in Méandre (Isère), to the west of Saint-Thibaud. These deposits are dated, respectively, to $8,790 \pm 190$ B.P. (Ly-1189—on bone) and $8,960 \pm 420$ B.P. (Ly-420—on bone) (Bintz & Desbrosse, 1979: pp. 244, 253; Schvoerer *et al.*, 1979: p. 39). These two sites also contain evidence of considerable concentration on marmot and ibex procurement in early Post-Pleistocene times, although other animals including a relict population of reindeer (!) were also hunted by people in this region flanking the Alps (Bintz & Desbrosse, 1979: p. 244).

11.3. Thoys I (Arbignieu, Ain)

This small shelter, also known as Abri de la Touvière, was dug from 1968–1971. It yielded a stratigraphy particularly rich in recent deposits (Iron & Bronze Ages, Chalcolithic and Neolithic) overlying a Sauveterrian series and a basal level which is characterized as 'Azilian-like' (Combier, 1977: p. 562; Bintz, 1976: p. 1407). This poor, problematical assemblage contains an Azilian point along with more 'Mesolithic' (*i.e.* Sauveterrian) elements. It has been firmly dated to the Preboreal/Dryas III limit by three radiocarbon determinations:

$10,220 \pm 650$ B.P. (Ly-620—charcoal), $9,390 \pm 150$ B.P. (Ly-599—calcium carbonates) and $9,350 \pm 300$ B.P. (Ly-270—charcoal) (Schvoerer *et al.*, 1979: p. 37).

11.4. Abri Gay (Poncin, Ain)

This is a huge rockshelter located near the famous Upper Palaeolithic site of la Colombière on the edge of the Ain River. Dug since 1970, it has provided a long stratigraphic sequence like Saint-Thibaud, running from the Late Magdalenian through the Azilian. The Azilian level, dated to $11,660 \pm 240$ B.P. (Ly-725—on bone), contains 7 painted pebbles and one engraved one together with a lithic industry almost entirely composed of Azilian points (nearly 90% to date) (Bintz, 1976: p. 1407; Bintz & Desbrosse, 1979: p. 249). Sedimentological analyses indicate cold, humid conditions probably attributable to Allerød. Reindeer dominates the ungulate fauna (Bintz & Desbrosse, 1979: pp. 244, 249), and there are arctic species of birds (Mourer-Chauviré, 1979).

There is a Dryas III date for a 'Terminal Magdalenian' deposit at the Abri des Douattes in Mussiège (Haute-Savoie): $10,680 \pm 450$ B.P. (Ly-453—on bone). There is a second date of $12,480 \pm 260$ B.P. (Ly-435), apparently from the same level. This is overlain by a poor Azilian level (Thevenin *et al.*, 1979: p. 226; Desbrosse & Girard, 1974). Reindeer and horse are present in both levels. Desbrosse and Girard (1974) tend to reject both dates, and on the basis of two isolated pollen spectra, tentatively place the Magdalenian level in early Allerød. The Azilian would thus be more recent. Indeed, at the 'Vieille Eglise' rockshelter in La Balme-de Thuy (Haute-Savoie) an Azilian deposit (Level 7A) has recently been dated on bone collagen to $9,820 \pm 200$ (Ly-2619) and $9,485 \pm 325$ B.P. (CRG-410) (Ginestet, 1984). The lithic industry includes 77 retouched tools, of which 34.6% are endscrapers (mostly short forms), 3.8% burins, 22.1% backed bladelets, 11.7% Azilian points, and no perforators or geometric microliths. There are no harpoons preserved. The Azilian fauna in this alpine site is dominated by ibex, with no reindeer, and only small quantities of red and roe deer. Overlying Level 6 contains lithic assemblages resembling that of Level 7 in some respects, but has a Sauveterrian point, several geometric microliths, no Azilian points, and a ^{14}C date of $8,170 \pm 160$ B.P. (Ly-1936). The Balme-de-Thuy Terminal Azilian thus seems firmly dated to Preboreal.

12. THE SITES OF BOURGOGNE

12.1. Varennes-les-Mâcon

Sites were found during highway construction and salvage excavations were conducted by J. Combier (1979). A hearth at site No. 10, characterized as 'Azilian', has been charcoal dated to $8,080 \pm 280$ B.P. (Ly-848) (Schvoerer *et al.*, 1979: p. 40). This date is said by the excavator to be apparently 'too young' for an Azilian industry, and therefore must have been 'probably polluted by roots' (Evin *et al.*, 1975: p. 26).

Site No. 11 is a separate locus in the same bog as No. 10. Charcoal from it has been dated to $11,860 \pm 190$ B.P. (Ly-849), a date which is judged by Combier (1979: p. 265) to be too old. Pollen and fauna are poorly preserved. The only ungulates are bovines. The lithic industry is quite lamellar and is overwhelmingly dominated by Azilian points. There are also specialized types found in the Terminal northern Magdalenian (e.g. Hamburgian and Zonhoven points). Endscrapers outnumber burins. Combier (1979: p. 263) sees similarities to the Azilian, but also to the Terminal Magdalenian of the Paris Basin at such sites as Pincevent (dated incidentally, by a large number of radiocarbon determinations ranging from about 12,000 to about 9,500 B.P.; Schvoerer *et al.*, 1979: pp. 27-28). This site in Burgundy, lacking Azilian harpoons and cobbles, should thus best be qualified as 'Epimagdalenian'; it is clearly on the frontier of the distribution of assemblages which can reasonably be assigned to the Azilian. Such assemblages are absent in North-central France. Other assemblages with surer Azilian 'trademarks' have been found at Rochedane in northeastern France (Franche-Comté), although here there are also similarities to the north European Epimagdalenian.

13. THE SITES OF FRANCHE-COMTÉ AND ALSACE (DOUBS AND HAUT-RHIN)

13.1. Rochedane (Villars-sous-Danjoux, Doubs)

The Rochedane rockshelter, located near the borders of Switzerland and Alsace, has been excavated, analyzed and extensively published by A. Thévenin (1976a; Thévenin *et al.*, 1979). Levels D2 and D1 contain Azilian-type points and short endscrapers in large numbers, but few burins. They have also yielded painted and engraved pebbles. There is a radiocarbon date of $11,060 \pm 470$ B.P. (Ly-1193—on

bone) from Level D1, whose sediments show evidence of intense frost weathering activity. The rodents are also cold species and reindeer is present. Given the ^{14}C date, this level is assigned to the Allerød period by the researchers (Thévenin *et al.*, 1979: p. 227). Level C1, which lies between Levels D1 and D2, dates to $11,090 \pm 260$ B.P. (Ly-1192—on bone) (Schvoerer *et al.*, 1979: p. 40). This would seem to confirm a late Allerød age for these deposits. The C1 industry is similar to the D assemblages and also contained an engraved pebble.

Level A4 has a similar industry, still without large Azilian-type points, many short (thumbnail) endscrapers, plus some backed bladelets, but very few burins. Six more engraved pebbles were found in this level (and many more in old backdirt). The base of Level B has been dated to $10,730 \pm 190$ B.P. (Ly-1194—on bone), and on the basis of the multidisciplinary studies, has been tentatively assigned to Dryas III (Thévenin *et al.*, 1979: p. 227).

Level A4 has a similar industry, still without geometric microliths, despite a decrease in the size of the tools. There are a fair number of backed bladelets and short, thick endscrapers are abundant. This level has been dated to $9,210 \pm 120$ B.P. (Gif-2530—on bone). Cold rodents are entirely absent, although among the bird remains there are still some of *Lagopus* sp. The macrofauna includes large quantities of *Cervus*, *Bos primigenius* and *Sus*. Level A4 is assigned to Preboreal (Thévenin *et al.*, 1979). It is followed by levels with geometric microliths of classic 'Mesolithic' appearance dating to late Preboreal and Boreal (Thévenin, 1976a).

In summary, Rochedane, far from the classic Azilian area, but containing numerous decorated cobbles and Azilian points (despite its lack of harpoons), has an Azilian stratigraphic sequence which fairly clearly spans the period from Allerød to Preboreal, confirming the evidence from sites to the south.

13.2. Mannlefelden (Oberlarg, Haut-Rhin)

This review concludes with a site about 1050 km in a straight northwest direction from La Paloma, the rockshelter of Mannlefelden, located near the junction of the French, Swiss and German borders, not far from Basel. Excavations underway since 1971 have revealed 7 m of stratigraphy in this modest cavity, the basal level of which (T) was laid down under very cold conditions with intense cryoclastic activity and an almost treeless vegetation attributed to Dryas III (Thévenin, 1976b: p. 1491). Level S

contains an Azilian assemblage, with Azilian points and angular backed knives, plus small backed blades. This level dates to $10,220 \pm 330$ B.P. (Ny-21) and has sedimentological evidence of decreased frost-weathering (smaller *éboulis* which are also more rounded than in Level T). Pollen and macrobotanical analyses show that pine was the main arboreal taxon. Level S is either Late Dryas III or at the limit with Preboreal (Thévenin, 1976b; Thévenin *et al.*, 1979: pp. 227-229).

Level R is culturally nearly sterile, but Level Q contains an assemblage rich in geometric microliths (including isosceles triangles, convex base micropoints, *etc.*). It has pollen from thermophile trees, which, given the northerly, continental location, is good evidence of fairly warm, humid conditions. There are two radiocarbon dates for Level R: $9,410 \pm 110$ B.P. (Lv-859) and $9,030 \pm 160$ B.P. (Gif-2387), both on charcoal samples. There is also a concordant date from overlying Level P: $8,230 \pm 300$ B.P. (Ly-1297) (Thévenin, 1976a; Thévenin *et al.*, 1979: p. 229; Schvoerer *et al.*, 1979: p. 40). A Preboreal age for Level Q seems clear. The Level Q industry is characterized as 'Early Mesolithic' or 'Germanic Epipalaeolithic'.

14. CONCLUSIONS

A summary of the likely ages of Azilian assemblages discussed in this review is presented in table 1. In general, assemblages labelled as 'Azilian' can be found in deposits dating from as old as 12,000 B.P. to as recent as 9,000 B.P. They can span, as an ensemble, the Allerød, Dryas III and Preboreal pollen zones or periods, and thus straddle the Pleistocene/Holocene boundary as it is traditionally (albeit arbitrarily) defined. Recent synthesis of the oxygen isotope evidence of deep sea cores also places the stage 1-2 boundary at c. 10,000 B.P. (Hays *et al.*, 1976: p. 1131; see also Woillard and Mook (1982) for correlation to the onset of Preboreal at the Grande Pile bog at this date).

It is clear that there is considerable variability and disaccord among the different methods used to date the Azilian deposits. Table 2 presents the Azilian levels as they have been dated by radiocarbon and by interpretation of palynological and sedimentological results. Site-by-site and level-by-level there are significant differences among the dates derived from the various methods. Only very rarely (Pont d'Ambon 2, Jean Pierre 5A and Pégourié 5-4) is there agreement among the ^{14}C determinations

and both the pollen and sediment 'dates'. In only a few more cases is ^{14}C in agreement with either pollen or sediments (Ekain II, Rascaño I, La Riera 27, Borie del Rey 3, Le Morin A, Abri Gay). However even in these cases of apparent agreement there are instances of equivocal ^{14}C dates or problematical Azilian attribution. There are many more instances where palynology and sedimentology are in apparent agreement but are either in disaccord with ^{14}C dates or lack radiocarbon controls. Whether in cases of one-way dating, two-way or three-way chronological concordance, as in disaccord, the dates for assemblages assigned to the Azilian culture-stratigraphic unit clearly do span the Allerød, Dryas III and Preboreal, with more problematical tails to the distribution in the Dryas II and Boreal. Table 2 shows that frequently radiocarbon dates are younger than palynological 'dates', as noted earlier particularly with regard to deposits in northern Spain palynologically attributed to Allerød.

There is considerable evidence of temporal overlap on the one hand with 'Magdalenian' assemblages (including ones with cylindrical section harpoons) and, on the other hand, with 'Mesolithic' ones (*e.g.* Sauveterrian, Asturian). Of course part of this overlap may be due to the many uncertainties and errors which are inherent to the radiocarbon method (*e.g.* the variable ratio of atmospheric $^{14}\text{C}/^{12}\text{C}$, contamination with both old and recent carbon, stratigraphic disturbance, differences between distinct sample materials, differences among laboratories, *etc.*). However, as the Magdalenian, Azilian and Mesolithic are all part of a cultural continuum, with few clear-cut, abruptly-marked differences in technology, real overlap is to be expected. Indeed cases of physical association of such supposedly temporal diagnostics ('fossil directors') as cylindrical- and flat-section harpoons prove this point quite dramatically.

Any review such as the present one is beset by the fundamental problem of definition. There is no such thing as a 'typical' Azilian assemblage. As in all Upper Palaeolithic industries, for example, there is considerable inter-assemblage variability both in terms of 'fossil director' types (harpoons, decorated pebbles) and in terms of relative frequencies not only of Azilian points and short endscrapers, but also microliths, endscrapers, burins and other major tool classes in general. There is admittedly a fair degree of circularity involved in the assignment of assemblages to the Azilian (or to any other culture-stratigraphic unit arbitrarily concocted by prehis-

Table 1. Azilian chronology (X =likely age; ?=possible age).

Sites	12,250 B.P.	Dryas II	11,750 B.P.	Allerød	10,750 B.P.	Dryas III	10,150 B.P.	Preboreal	8,650 B.P.	Boreal	7,450 B.P.	Atlantic
Oscura de Ania	—	—	—	—	—	—	—	X	—	—	—	—
Los Azules	—	—	—	—	—	X	—	X	—	—	—	—
La Riera	—	—	—	?	—	X	—	?	—	—	—	—
El Pendo	—	—	—	—	—	X	—	?	—	—	—	—
Cueva Morín	—	—	—	—	—	X	—	—	—	—	—	—
Rascano	—	—	—	—	—	X	—	—	—	—	—	—
Pielago	—	—	—	—	—	?	—	—	—	—	—	—
Arenaza	—	—	—	—	—	—	—	?	—	—	—	—
Santimamine	—	—	—	—	—	—	—	?	—	—	—	—
Urtiaga	—	—	—	—	—	—	—	X	—	—	—	—
Ekain	—	—	—	—	—	?	—	X	—	—	—	—
Zatoya	—	—	—	X	—	—	—	—	—	?	—	—
Abauntz	—	—	—	—	—	—	—	X	—	—	—	—
Duruthy	—	—	—	—	—	—	X	—	—	—	—	—
Dufaure	—	—	—	—	—	—	X	—	—	—	—	—
Poeymati	—	—	—	X	—	?	—	?	—	—	—	—
La Vache	—	—	—	X	—	—	—	—	—	—	—	—
Rhodes II	—	—	—	?	—	X	—	—	—	—	—	—
Mas d'Azil	—	—	—	—	—	?	—	?	—	?	—	—
Tourasse	—	—	—	—	—	?	—	?	—	?	—	—
Margineda	—	—	—	—	—	X	—	X	—	X	—	—
Gazel	—	—	—	—	—	—	X	—	—	—	—	—
Pompignan	—	—	—	—	—	—	X	—	—	—	—	—
Chinchon	—	—	—	—	—	—	—	?	—	—	—	—
Salpêtrière	—	—	—	—	—	—	—	?	—	—	—	—
Tête du Chien	—	—	—	—	—	—	X	—	—	—	—	—
Borie del Rey	—	—	—	—	—	X	X	—	—	—	—	—
Pégourié	—	?	—	X	—	—	—	?	—	?	—	—
Graves	—	—	—	—	—	—	—	X	—	—	—	—
Faurélie	—	—	—	—	—	—	—	?	—	—	—	—
Pont d'Ambon	—	—	—	?	—	—	X	X	—	—	—	—
Chez Jugie	—	—	—	X	—	—	—	—	—	—	—	—
Bois Ragot	—	—	—	—	—	X	—	X	—	—	—	—
Saut du Loup	—	—	—	X	X	—	—	—	—	—	—	—
Jean Pierre I	—	—	—	X	—	X	—	X	—	—	—	—
Thoys	—	—	—	—	—	—	X	X	—	—	—	—
Abri Gay	—	—	—	X	—	—	—	—	—	—	—	—
Varennes-les-Mâcon	—	—	—	—	?	—	—	—	—	?	—	—
Rochedane	—	—	—	X	—	X	—	X	—	—	—	—
Mannlefelden	—	—	—	—	—	—	X	—	—	—	—	—
Les Douattes	—	—	—	—	—	—	?	—	—	—	—	—
Balme-de-Thuy	—	—	—	—	—	—	—	X	—	—	—	—

torians). Hopefully this revision has at least called attention to the significant variability in composition and dating of assemblages commonly attributed to this classic archaeological construct.

Some broad patterns also seem to be revealed by the exercise:

1. Harpoons are far more common in the sites of the Vasco-Cantabrian, western and central Pyrenean regions than in the rest of the Azilian 'culture-area'. The reason is likely to be functional, such as the possibility of a concentration on salmon fishing (to be proven) in rivers draining into the southern shore of the Bay of Biscay.

2. Decorated pebbles are concentrated in just a few sites (*i.e.* Mas d'Azil, Rochedane and, to lesser extents, Abri Pagès and Los Azules), but the styles of decoration cross-cut the rather rigidly demarcated distribution of harpoons (Thévenin, 1982; see also Fernández-Tresguerres, 1980; Bahn & Couraud, 1982). While absent in many (or most) Azilian deposits, these pebbles help confirm that the Azilian had some sort of reality or unity (as yet to be fully defined or understood).

3. Dated Azilian deposits in the southern sector (Cantabria, Vascongada, Gascony, Foix, Roussillon, Languedoc and Provence) seem as a whole to

cluster more tightly in the later time range (Dryas III and Preboreal). While there are also many assemblages from more northerly sites which date to these periods, many more there seem to clearly date to Allerød. La Vache and the basal Azilian deposit at Poeymaü are the sole strong exceptions to the 'rule' in the southern sector. This tentative pattern presents an apparent paradox, as it would seem to contradict expectations of earlier adaptive change to meet logically earlier major environmental changes at the close of the Pleistocene in the southern area. In fact the latest sedimentological and paleontological evidence from Aquitaine seems to suggest that 'Allerød' began and lasted longer there than in northern Europe (Laville, 1979; Delpech, 1979; *pace* Leroi-Gourhan & Girard, 1979). The relationships between Stone Age technologies and environmental changes are clearly not simple or direct, and this is one obvious case in point, as further noted below.

4. A chronological synthesis such as the present study which places primary emphasis on the overall pattern of the radiocarbon dates, gives significantly different results than the interpretations of the pollen record from many of the same archaeological sites. As noted throughout, the conclusions based more heavily on radiocarbon are at particular variance with those of Arlette Leroi-Gourhan, especially for Cantabrian Spain, tending to be consistently younger than hers (Leroi-Gourhan, 1971b; Leroi-Gourhan & Girard, 1979; Leroi-Gourhan & Renault-Miskovsky, 1977). There are problems with dating based on radiocarbon, of course, but palynological dating contains an added measure of subjectivity, plus major components of sampling error (involving habitat differences, winds, over- and under-representation of species in the pollen record, effects of small sample size, differential preservation, problems with the specificity of identifications) which have yet to be at all adequately critiqued and controlled. Palynological dating is, in short, several steps removed from 'reality'. Only further research can help us decide upon the accuracy and consistency of this method as a cross-dating device for archaeological sites, which is not to deny palynology's tremendous value as an indirect indicator of past vegetations on the local and regional scales.

5. The Azilian is undeniably in some way related to the major readjustments in human adaptations which came about at the time of (and in part, due to) the glacial/interglacial transition which occurred during the period centered on the date of 10,000

B.P. The nature of this relationship is, however, far from clear. For one thing the faunal change at the Pleistocene/Holocene boundary was far from uniform. Reindeer was never a significant resource in Vasco-Cantabrian Spain, where red deer and ibex were the key Upper Palaeolithic and Azilian ungulate game species. Nevertheless, the Azilian of this region is quite similar in artifact content to that of the Pyrenean region, where reindeer (and other open country grazers) were replaced in the early Holocene by species favoring temperate, woodland environments. In fact, within the territory which now constitutes continental France, reindeer extirpation came at different times, depending on latitude and, particularly, on the presence or absence of mountain ranges, where relict populations of *Rangifer* apparently survived up to or just past the Pleistocene/Holocene boundary, and were exploited by 'Azilian' hunters. This seems to have been the case in parts of the Pyrenees, Massif Central and Alps, although the data are still fairly scanty and controversial. Despite major faunal differences among the various French regions (*e.g.* SE vs. SW vs. northern) and between these and Vasco-Cantabrian Spain, there are both broad and detailed similarities in Azilian technology.

For another thing, some of the changes in subsistence strategies had been underway long before the somewhat arbitrary date of 10,000 B.P., and seem to have been rather independent of major environmental changes. This is certainly the case with Cantabria, where is substantial evidence of intensification through specialized hunting and diversification of the resource base (to include, notably, increasing amounts and kinds of aquatic foods) (Straus *et al.*, 1980; 1981; Clark & Straus, 1983). These changes occurred during the Solutrean and Magdalenian, and continued apace during the Azilian/Asturian. Glacial/interglacial transitions had occurred at least 11 times before/during the c. 1 my tenancy of *Homo* in Europe, but the adaptive shift to intensive, efficient, broad-spectrum subsistence strategies only occurred this last time. I suggest that the added element which made a crucial difference was a denser human population. In physically constrained areas such as Cantabrian Spain, the shift had to come somewhat earlier, during the Würm Upper Pleniglacial. Here the Azilian adaptations constituted a refinement, but were still a continuation of long-developing trends. In other regions they may have represented more of a novelty and a transition to true 'Mesolithic'-type adaptations. The formation of true shell middens of considerable

Table 2 (continued).

Phases	Direct ¹⁴ C	Indirect ¹⁴ C	Pollen	Sediments
Allerød	La Riera ² 27* Zatoya II low, BIII Poeymau CPE Pégourié 5-4() ^{*1} Chez Jugie Bois Ragot 4b Saut de Loup III ² Abri Gay ² Rochedane D1, C1		La Riera ² 25, ³ 26 ³ , 27 ² , 28 Cueva Morín I Oscura de Ania() Otero I(?) Rascaño I Rhodes 5, 6(?) ² La Vache stalag ² Pégourié 6-4 ¹ Pont d'Ambon 3a ² Jean Pierre 7, 6C, 6B ¹	La Riera ² 25, 26 Tourasse() Pégourié 7-4 ¹ Pont d'Ambon 3a Jean Pierre ¹ 7, 6C ¹ , 6B ³ Abri Gay ² Saut du Loup ² III ² , II
11, 750 B.P.	Rhodes 5, 6(?) ² Varenes 1 I(?) Jean Pierre 7 ¹			
Dryas II			Pégourié 7	
12, 250 B.P.				

* = alternate ¹⁴C dates for same level

¹ = three-way dating concordance

² = two-way dating concordance with ¹⁴C

³ = concordance between pollen and sediment 'dates' only

(?) = problem with 'Azilian' attribution

() = possible problem with dating

volume in Late Azilian times (the 'Asturian', the 'Arudian', and 'Arisian') represent the logical consequence of this trend toward intensification in the efforts of human groups to survive against a background of both changed environments and increased populations. As I said before, the relationship between Azilian technology and adaptations is far from straightforward. We are only now beginning to perceive and pose the correct questions of the prehistoric archaeological record.

Azilian assemblages of artifacts and fauna do indeed lie in between the Magdalenian and Mesolithic in composition and in their behavioral implications. The Azilian clearly belonged to two worlds and can genuinely be viewed as 'transitional'. One can but only speculate that the apparently abrupt change in artistic activity coeval with the Azilian, might be a reflection of new forms of social organization. Indeed, it is likely that the adaptations to post-Pleistocene conditions may have involved considerable readjustments of social organization, including territorialism, at best only inadequately

reflected by the standard sorts of data and analyses archaeologists use in the study of the Azilian. The more we learn, the more we discover our ignorance of the past.

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16. SUMMARY

Starting from the perspective of Vasco-Cantabrian Spain, this article reviews and evaluates the evidence for the age of the Azilian there and in South, Southwest, Southeast, East and Northeast France. A relatively high degree of reliance is placed on radiocarbon dating, which is used in conjunction with sedimentological, paleontological and palynological indicators, although interpretations of the pollen record are shown to often be at variance with (and usually 'older' than) the radiocarbon dates.

The Azilian is shown as an ensemble to span the Allerød, Dryas III and Preboreal periods, from c. 12,000 to c. 9,000 B.P., thus straddling the Pleistocene/Holocene boundary. However the southern sites tend to be more strictly later than the more northerly ones in France for reasons which are unclear. The Azilian is also highly variable in terms of the composition of its artifact and faunal assemblages. The relationship between Azilian technology and supposedly abrupt adaptation to radically changed environments/resources at the 10,000 B.P. boundary is not straightforward. The Azilian is indeed 'transitional' in that it contained artifactual and faunal elements found in both the Magdalenian and Mesolithic, with which it temporally overlapped. The nature of the adaptive change, the culmination of trends underway long before 10,000 B.P. in areas such as Cantabrian Spain, may ultimately have lain in alterations in the social organization of human groups (perhaps reflected in the brusque changes in artistic behavior between the Magdalenian and Azilian).

17. RÉSUMÉ

Prenant comme point de départ les données de la région cantabrique, cet article analyse l'ensemble existant des témoins pour l'âge de l'Azilien là et dans le Sud, Sud-Ouest, Sud-Est, Est et Nord-Est de la France. On met un haut degré de confiance dans les datations du radiocarbone, qui sont employées ici en conjonction avec les indices sédimentologi-

ques, paléontologiques et palynologiques, bien qu'on montre que les interprétations chronologiques. Il y a une tendance systématique vers un vieillissement relatif des datations palynologiques, surtout dans les Cantabres.

L'ensemble des gisements aziliens embrasse la période qui comprend Allerød, Dryas III et Préboreal, entre 12.000 et 9.000 ans B.P. environ. Donc, l'Azilien est à califourchon sur la limite Pleistocène/-Holocène. Cependant, les gisements méridionaux ont une tendance à être plus strictement jeunes que ceux qui se trouvent plus au nord.

L'Azilien est aussi très variable en ce qui concerne la composition des ses assemblages industriels et fauniques. La relation entre la technologie azilienne et la supposée adaptation abrupte aux environnements et ressources changés vers la limite de 10.000 B.P. n'est pas simple. L'Azilien est en effet une étape de 'transition' par le fait de renfermer des éléments industriels et fauniques trouvés dans le Magdalénien et le Mésolithique, avec lesquels il existait un recouvrement temporel. La nature des changements adaptatifs, qui étaient l'apogée des tendances mises en route bien avant 10.000 B.P. dans des régions comme l'Espagne cantabrique, aurait consisté en fin de compte en des modifications dans l'organisation sociale des groupes humains (réfléchies peut-être dans les changements brusques dans le comportement artistique entre le Magdalénien et l'Azilien).

18. RESUMEN

Empezando con la perspectiva de la region cantábrica, este artículo pasa revista y evalúa la evidencia para la edad del Aziliense allí como en el sur, suroeste, sureste, este y nor-este de Francia. Se da un grado relativamente alto de confianza a las fechas del radiocarbono, que se usan en conjunción con los indicios sedimentológicos, paleontológicos y palinológicos, aunque las interpretaciones de los espectros polínicos se muestran muchas veces desavenidas (y por lo general más viejas) en relación con las fechas del radiocarbono.

Como conjunto, los yacimientos azilienses atraviesan el periodo de Allerød, Dryas III y Preboreal, desde alrededor de 12.000 B.P. hasta 9.000 B.P., y así está a horcajadas al límite entre el Pleistoceno y el Holoceno. Sin embargo, los yacimientos meridionales tienden a ser más estrictamente tardíos que los yacimientos más septentrionales. El Aziliense es también muy variable en cuanto a la composición

de sus conjuntos industriales y faunísticos. La relación entre la tecnología aziliense y la supuesta adaptación abrupta a los medios ambientes y recursos en torno al límite de 10.000 B.P. no es sencilla. El Aziliense es de hecho 'transicional' al tener unos elementos industriales y faunísticos hallados en el Magdalenense y en el Mesolítico, con los cuales se sobrepone temporalmente. La naturaleza del cambio adaptivo, que era la culminación de unas tendencias en camino mucho antes de 10.000 B.P. en zonas como la región cantábrica, habría podido consistir últimamente en alteraciones de la organización social de los grupos humanos (quizá reflejadas en los cambios bruscos en el comportamiento artístico entre el Magdalenense y Aziliense).

19. NOTES

1. Possible Azilian stone tools were also found by the Conde de la Vega del Sella (1916; 1930) in the adjacent Llera sites of Cueto de la Mina and Balmori, but in very uncertain stratigraphic position. These pieces (small endscrapers and backed bladelets—which are also very frequent in the regional Upper Magdalenian) were not accompanied by flat-section harpoons. A possible painted cobble from the cave of El Pindal, also in extreme eastern Asturias, was found completely out of stratigraphic context during construction done to provide protection and access to this Upper Palaeolithic rupestral art sanctuary. No other possible Azilian materials were found in subsequent test excavations (Fernández-Tresguerres, 1980: p. 51).
2. There are a few other sites with Azilian harpoons in Asturias and Santander. These include Cueva Oscura de Perán, La Meaza (an important, inadequately published site in western Santander, where the Azilian deposit with painted cobbles apparently overlay an Upper Magdalenian level and possibly underlay an Asturian conchero), El Salitre and El Valle. There are no independent chronological indices available for these sites. There is a radiocarbon date (on charcoal) of $10,400 \pm 515$ B.P. (GaK-2548) for a 'pre-Asturian' shell midden deposit at the top of the Upper Palaeolithic sequence in El Cierro, a cave in eastern Asturias (Clark, 1976). There are as yet no published results from the new University of Salamanca excavations in this site which could clarify the culture-stratigraphic attribution of the Terminal Pleistocene deposit.
3. There are several other sites in the Spanish Basque Country with Azilian harpoons but for which there are few other data and no independent chronological indicators. These include Balzola (Dima, Vizcaya), Goikolau (?), Lumentxa (Level 8-lower) in Vizcaya, Ermitia and Pikandita in Guipúzcoa. Other deposits contain no Azilian harpoons, but are assigned by the authors to this culture-stratigraphic unit because of their position above the Upper Magdalenian or below the Bronze Age/Eneolithic and because of the composition of their lithic assemblages. These include Level III of Berroberria in Navarra (Maluquer de Motes, 1964), Level I of Aitzbitarte IV and with less security, Silibranka, Bolinkoba, Atxurra in Vizcaya, Agarre, Kobatxo and Aitzbeltz in Guipúzcoa (Altuna *et al.*, 1982). Despite the importance of Aitzbitarte IV, a major Upper Palaeolithic site near the Franco-Hispanic border in the hills above San Sebastián, and despite its fairly recent excavation, there are no paleoclimatic studies and no radiocarbon dates for the Azilian or Magdalenian.

The Aitzbitarte Azilian fauna, which is quite diversified, includes *Sus* and *Capreolus* (as well as certainly intrusive remains of sheep/goat). The Ermitia Azilian level (II) also contains remains of *Sus*, but none of *Capreolus* (Altuna, 1972).

4. In fact, the rapid reforestation begun in Allerød and only temporarily affected by Dryas III is testified to by the systematic presence of roe deer (*Capreolus capreolus*) and boar (*Sus scrofa*) in deposits pertaining to both phases. These species are true woodland creatures (unlike *Cervus elaphus*, which is far more flexible in its habits), so their presence in Dryas III deposits in Vasco-Cantabrian Spain is clear evidence of the attenuated nature of the cooling associated with this brief climatic phase in this region. Presence of roe deer and boar should not be taken as evidence necessarily contradictory of a Dryas III age determined on the basis of radiocarbon and/or sedimentology at such southerly latitudes.

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