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Last Glacial Human Settlement in Eastern Cantabria (Northern Spain)

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While the excavation of individual sites remains fundamental to the creation of the Palaeolithic archeological record, increasingly the focus of prehistoric research is on human adaptations to and within natural regions. Such a reorientation implies viewing sites and occupations as samples of different suites of activities in various habitats across space and time; it is dependent on the use of radiocarbon to date and relate occupation residues among sites; and it necessitates the application of methods to uncover patterns of human mobility as an integral aspect of subsistence economy, demographic arrangements and social relations. This paper contributes to the regional study of Last Glacial foragers by presenting preliminary aspects of a case study from the Asón River basin in eastern Cantabria. Assembled here are data from several recent and a few older excavations in sites distributed between the present shore of the Bay of Biscay and the uplands of the Cantabrian Cordillera. The main sites are El Otero, La Chora, La Fragua and El Perro near or at the present mouth of the river, the classic cave of El Valle in the mid-valley, and El Mirón and El Horno near the cave art loci of Covalanas, La Haza and Cullalvera in the upper valley. While the highest density of known sites in the whole drainage area occurs during the Magdalenian and Azilian periods (17–10 kya), there is evidence for substantial abandonment of the montane interior during the Mesolithic, when human settlement was concentrated around the estuary of the Asón, after which time the whole valley was repopulated in the Neolithic.

Keywords: MIDDLE PALAEOLITHIC, EARLY UPPER PALAEOLITHIC, SOLUTREAN, MAGDALENIAN, AZILIAN, MESOLITHIC, CANTABRIA, SPAIN, SETTLEMENT.

Introduction

Prehistoric archaeologists have increasingly come to realize that, although the basic unit of analysis is still the site, the most valid, inclusive framework for interpretation is at the level of the region, even if the concept of "region" remains elusive (e.g., Conkey, 1987; cf. Price & Peterkin, 2000). This is particularly true in the study of mobile foraging societies which must cover annual territories of varying size (depending on population density, resource structure and availability) in order to survive (e.g., Binford, 1982; Jochim, 1981; Kelly, 1995). The reorientation of prehistoric research from a site-centred to a region-focused perspective is emblematic of the general paradigm shift from a culture-historical approach to a palaeoecological/palaeosociological one that is characteristic not only of American and British archaeologists, but also of many European ones—including Spaniards (see Estévez & Vila, 1999).

For the purposes of this paper, the concept of region is used at two levels: the major geographical region (in this case: the Vasco-Cantabrian region) and the local area (the Río Asón drainage). Both are physically defined and are distinctive in such ways as to make it very likely that they were meaningful units in the world of Palaeolithic hunter-gatherers. Vasco-Cantabria (from east to west, the modern provinces of Guipúzcoa, Vizcaya, Cantabria and Asturias) is a narrow, generally calcareous, hilly, coastal region, centred on 43°15′ north latitude, between 2° and 6° west longitude (Figure 1). It is bounded to the north by

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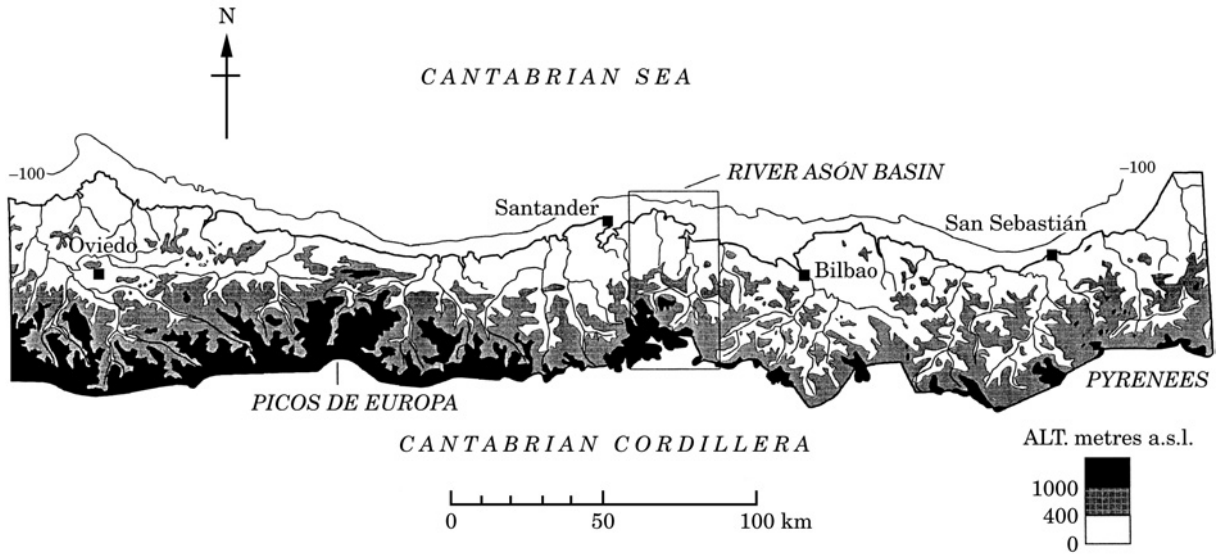

Figure 1. Relief map of the Vasco-Cantabrian region of northern Spain showing the capital cities of the four provinces and the location of the Río Asón drainage basin in eastern Cantabria Province. (Map drafted by M.González Morales.)

the Bay of Biscay, to the south by the Cantabrian Cordillera, to the east by the western end of the Pyrenees, and to the west by the geographically distinctive shieldrock region of Galicia. The highest elevations (*c*. 2600 m) are attained in the Picos de Europe, no more than 25 km from the present shore of eastern Asturias and western Cantabria, but the Cordilleran crestline is half as high in much of the Basque sector to the east. The western sector of the Cordillera is backed by the high (800–1000 m), climatically harsh tablelands of Old Castile, while the Basque mountains are abutted by the broad and much lower Ebro River basin, with markedly Mediterranean climate and vegetation that are in dramatic contrast to the Atlantic environment of the northern coastal strip.

Substantial glaciers existed during the Last Glacial all along the Cordillera, with northern terminal moraines at often surprisingly low elevations (600–800 m). On the other hand, given the very steep coast and narrow continental shelf, only a limited strip of now-inundated land (*c*. 6–12 km wide) was exposed as a result of full glacial sea level regression. Climate today along the Cantabrian coast—under the strong influence of the Gulf Stream—is temperate, equable and humid. But the Gulf Stream was not present during full glacial periods, resulting in severe temperature depression (on the order of 10°C), but with generally prevalent humidity and storminess (Butzer, 1981, 1986; CLIMAP, 1976; Straus, 1992). Vegetation cover has varied over the last interglacial-glacial-interglacial cycle from dense, mixed deciduous forest to open, virtually treeless heath- and grasslands, and back to luxuriant Holocene forest that has been repeatedly decimated by massive agro-pastoral and industrial activity especially since Bronze Age times. As part of the Iberian peninsular refugium of southwest Europe, Vasco-Cantabria has harboured a resident macromammalian fauna dominated by red deer and ibex, together with chamois, horses and bovines (aurochs or bison, depending on conditions), supplemented during glacial periods by limited quantities of reindeer. Temperate woodlands saw the growth in importance of roe deer and boar. The many, short, steep rivers of the region and their estuaries have contained salmon and trout under both glacial and interglacial conditions, while the littoral has been rich in marine fish, molluscs and crustaceans (Altuna, 1972, 1992; Freeman, 1973, 1981; Straus, 1977, 1992).

The prehistory of Vasco-Cantabria has been mainly written over the past century and a quarter—since the discovery of Altamira in central Cantabria Province by Marcelino Sanz de Sautuola—at sites concentrated in the lowland coastal zone and particularly clustered near the principal cities (San Sebastián, Bilbao, Santander, Oviedo) and around the palace of the Conde de la Vega del Sella—one of the most prolific and conscientious fieldworkers of the early 20th century—in easternmost coastal Asturias. Probably due to poor communications and scant resources for research, large, nearly empty areas in the maps of prehistoric site distributions have continued to exist between the dense clusters of excavated sites, both along the coast, but especially in the mountainous interior. Excavated sites in high, montane settings were notably scarce (e.g., Collubil, Rascaño, Bolinkoba) and, ironically, these were first excavated many years ago and minimally or not published at all. A strong bias in favour of peri-coastal sites exists and little is known about the human use of the upland habitats through time. Another bias of a geomorphological

nature is the near-total lack of known open-air sites of all Stone Age periods in Vasco-Cantabria. Only sites in caves have been spared the systematic twin processes of erosion on the region's steep slopes and burial along its footslopes and valley floors. It is only through extraordinary circumstances that open-air sites (e.g., the Acheulean and Gravettian site of Irikaitz in Guipúzcoa, J. Altuna & A. Arrizabalaga, personal communications, 2001) are occasionally found, often deeply buried by colluvium.

The Río Asón Valley (Figure 2)

The Asón and its tributaries drain an area of *c.* 800 sq km in easternmost Cantabria. It is separated from the central part of the province (the area around the present-day Bay of Santander that is dotted by major sites, including Cueva Morín, El Juyo, El Pendo and La Garma) by a mountain chain crossed by 575 m Alisas Pass in the interior and by 200–300 m hills in the coastal zone. It is separated from western Vizcaya by the 731 m Campo Ventoso massif that plunges directly down to the sea east of the Holocene Oriñón estuary, although the Río Carranza tributary provides good access to the interior of Vizcaya. Contact with the *meseta* of Burgos from the upper Asón valley is today provided by the 1160 m Sia Pass and the 920 m Los Tornos Pass, but the Cordilleran crest—notably 1718 m high Castro Valnera—was substantially glaciated in this sector during the Upper Pleniglacial. The distance from Los Tornos to the presentday mouth of the Asón at Santoña is only 36 km, giving a further indication of the area's high relief. Within a long day's walk, prehistoric human groups would have had access to a wide variety of food and other resources from the shore to the high mountains in a very karstic area that is abundantly endowed with caves of all sizes and orientations. In many respects, the Asón is a microcosm of the environmental variability present in Vasco-Cantabria. As a rather typical (albeit large) valley for the region, it can provide an excellent case study of human settlement and mobility practices within a meaningful, geographically enclosed local socio-territorial unit. It was, nonetheless, in significant contact with other such units all along this narrow Atlantic coastal region, if only to maintain a network of social interactions necessary for demographic survival and information sharing, embedded within a system of shared symbols, beliefs and rituals. These are manifested in stylistically similar cave "art sanctuaries" and in the widespread distribution of distinctive portable art objects and motifs, that are suggestive of inter-band aggregations, exchange and intermarriage (e.g., Conkey, 1980; Straus, 1986). The long, narrow, coastal configuration of Vasco-Cantabria would have necessitated intensive linear east-west human contacts across river valley divides in order to maintain mating networks, despite the obvious economic advantage of

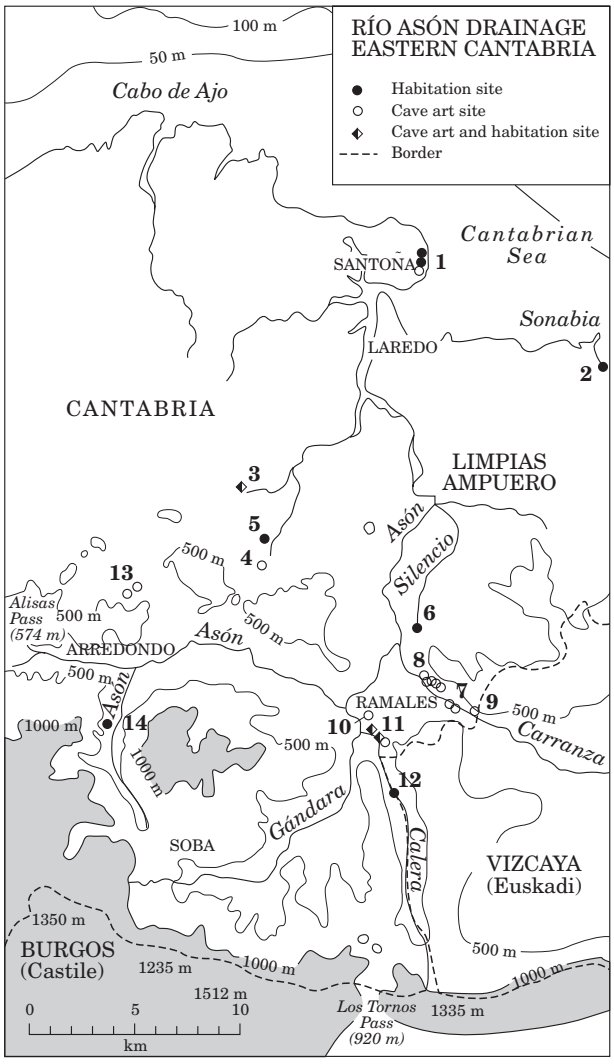

Figure 2. Relief map of the Río Asón drainage basin showing the locations of Palaeolithic and Mesolithic sites, major towns and other political, as well as geographic features. Sites included are as follow: 1. La Fragua, El Perro, San Carlos; 2. La Trecha; 3. El Otero; 4. Cobrantes; 5. La Chora; 6. El Valle; 7. Sotarriza, Covanegra; 8. Morro, Pondra, Arco A, B & C; 9. Venta de la Perra, Polvorín; 10. Cullalvera; 11. Ramales open-air site, La Haza, El Mirón, Covalanas, El Horno; 12. Tarrerón; 13. Los Emboscados, Patatal, Cubio Redondo; 14. Cubera. (Map redrafted by R. Stauber from original by L.G. Straus).

altitudinal north-south exploitation of the different, but closely spaced habitats of the region's high relief by local human groups (e.g., Wobst, 1974, 1976). Both macro- and micro-regions were intimately linked in the lives of prehistoric foragers.

The Asón's present 40 km long course can be divided into four segments: the Holocene estuary (from its mouth to the head of tidewater above Limpias), the mid-valley (from the confluence of the Río Silencio with the Asón at Ampuero to the confluence of the Río Carranza at the Portillo gorge), the east-west intermontane valley (from Ramales to Arredondo, with

eastern tributary rivers Calera and Gándara leading up to Tornos Pass and Soba Valley respectively and western tributary Río Bustablado rising to Alisas Pass), and the upper mountain gorge that begins at the dramatic waterfall source of the Asón in the Cordillera itself. Late Glacial sites are located along all stretches of the valley.

The broad lower valley crosses a rolling coastal plain and has as its major tributaries the Ríos Clarín and Clarón, which together drain the Aras Valley. The present Asón mouth is dominated by 376 m Monte Buciero. The middle valley, which considerably narrows upstream, is bordered by ridges generally 500–800 m high. The parallel valley of the Río Silencio is, however, quite broad and easily accessible to the main Asón Valley not only downstream, but also upstream via a low saddle near the confluence of the Carranza with the Asón. The major site of El Valle cave is located near this strategic crossroads, where the Silencio emerges from its 16 km-long karstic course. The Carranza is lined with about a dozen caves with either possible or definite Upper Palaeolithic parietal art and/or indications of Upper Palaeolithic habitation (González Sainz & San Miguel, 2001) and it leads up to the vicinity of the major art and residential site of Arenaza in eastern Vizcaya. The intermontane valley segment is lined by parallel crests of *c*. 500–600 m to the north and *c*. 900–1000 m to the south. At its eastern end is the strategic confluence of the Ríos Gándara and Calera with the Asón and the ascent up to Los Tornos Pass via the narrow hanging valley of Lanestosa. In addition to the important cave art sites of Cullalvera, La Haza and Covalanas, several other caves in this highly karstic area have yielded cultural remains of various periods, from the Mousterian through the Middle Ages—notably El Mirón. In the Matienzo depression within the mountains lining the south side of the intermontane valley of the Asón there are other caves with art or living sites. But, so far at least, only one archaeological site is known from a cave along the upper, north-south-oriented gorge of the Asón: Cubera.

Prologue: The Pre-Late Glacial Settlement of the Asón

Traces of possible Mousterian occupation have been found in the lower valley at El Otero (González Echegaray *et al*., 1966), in Venta de la Perra, adjacent Polvorín and possibly other caves along the Carranza gorge (Baldeón, 1990; González Sainz & San Miguel, 2001), and in Cabrito Cave, Rojo Rockshelter and possibly Murciélagos Cave in the intermontane valley near Ramales (Federación Cántabra de Espeoleología, 1995). At a depth of *c*. 4 m below the present surface in a 2 m^2 test pit, an apparent terminal Mousterian (represented by two flake denticulates) has been found in El Mirón Cave. This level has been dated by AMS radiocarbon on conifer charcoal to 41,280 ± 1120 BP. Thus, to date at least, no major Mousterian site is known from the Asón drainage. The impression is of very low Neandertal population density in Vasco-Cantabria, with only a few sites that can be interpreted as long-term residential loci—many of them concentrated in the central Cantabria area (notably El Castillo, El Pendo and Cueva Morín).

The same holds true for the early Upper Palaeolithic: there is no evidence in the Asón drainage for either Chatelperronian or Gravettian. El Otero yielded three assemblages that were attributed to the Aurignacian by González Echegaray *et al*. (1966), but none of the levels have been radiometrically dated. One of these is notable for the presence of a steppe rhinoceros, and horse is the most abundant species in another, although red deer is otherwise the dominant game animal. Small quantities of ibex, chamois, roe deer and, in one level, a large bovine complete the Otero Aurignacian ungulate faunas. There are traces of marine molluscs in the uppermost level, along with hyena, fox and cave bear (the latter also found in the middle level) (Madariaga, 1966).

Artifacts from Polvorín that have been very tentatively assigned to the Aurignacian, especially because there are said to be several split-base bone points (Ruiz Idarraga, 1990). Some Aurignacian-like blades have also been found in Venta de la Perra, but these are not separated in the collections from the Mousterian materials (Baldeón, 1990). TL dates on flowstone above and/or below parietal art images in Venta de la Perra and Pondra would seem to imply early Upper Palaeolithic (Aurignacian and/or Gravettian) ages for the execution of these works of parietal art (González Sainz & San Miguel, 2001). These TL determinations converted to radiocarbon ages (all with single standard deviations on the order of 10%) suggest dates of >22 kya for engravings in Venta de la Perra and between 19 and 30 kya for engravings and drawings in Pondra. The deep test pit in El Mirón has produced a radiocarbon date of 27·5 kya on charcoal from a level with some débitage, but no diagnostic artefacts. Early Upper Palaeolithic occupations of the Asón drainage clearly existed, but, as before, seem to have been either of very low density or discontinuous (or both). However, it is possible that more evidence of Middle and Early Upper Palaeolithic use of this valley would appear when/if deeper holes are dug in potential sites.

The on-going excavation of El Mirón Cave (e.g., Straus *et al*., 2001) has confirmed the existence of a Solutrean settlement of eastern Cantabria, which had only been suspected before on the basis of a couple of contextually undocumented discoveries of leaf points (in La Haza and on the surface near it). The Mirón materials come from a half-dozen thin lenses excavated in the top part of the deep test pit at the vestibule rear and dated between *c*. 19–17 kya. They include an astonishing number and diversity of lithic point types made on a wide variety of raw materials, as well as

many perforated teeth and shells, plus numerous fish vertebrae. Among the points are concave-base ones, very similar to pieces found mainly in eastern Asturias and western Cantabria (Straus, 1983). Although abundant débitage is present, there are few other retouched tools. Based on what is admittedly scanty evidence, but compared with other Vasco-Cantabrian valleys, the Asón, with no major Solutrean residential site, seems only to have been ephemerally but repeatedly visited by humans during the Last Glacial Maximum, perhaps en route between the major clusters of Solutrean sites in central Cantabria and central Vizcaya. On the other hand, given conditions of maximum sea level regression at this time and the presence of marine indicators in the inland site of El Mirón, it is quite possible that Solutrean sites existed on the now-flooded continental shelf near the Asón mouth. Nonetheless, it is striking that the numbers of sites increases dramatically during the Solutrean in Vasco-Cantabria relative to the longer Gravettian and Aurignacian periods—but not in eastern Cantabria/western Vizcaya, which on the current distribution map (Straus *et al*., 2000, Figure 9) seems to have been an almost empty zone. Finally, it should be noted that the standard view is to attribute the parietal red dot outline animal drawings in Covalanas and La Haza to the Solutrean; this is strengthened by the discoveries of Solutrean points not only in and near Haza, but also in Mirón—and in the similarly decorated cave of La Pasiega on Monte Castillo (Moure *et al*., 1991; Straus, 1983).

The Magdalenian "Boom"

The situation changed radically during the Tardiglacial with a major concentration of Magdalenian sites in the lower Asón valley (La Fragua, El Perro, El Otero, La Chora and probably Cobrantes), the major site of El Valle in the middle valley, the adjacent, complementary sites of El Mirón and El Horno in the intermontane valley, and possibly Cubera Cave in the upper gorge. Both Otero and Chora contained Upper Magdalenian artifact assemblages, including numerous svelte antler harpoons, as well as *sagaies* and other carved and/or decorated antler items (González Echegaray *et al*., 1963, 1966). These deposits are not radiometrically dated. The faunas are dominated by red deer, but there are also horse, ibex, large bovines, roe deer, chamois and boar, along with some bear, fox, wolf and wildcat. Marine molluscs are diverse and abundant, and there are traces of fish (Madariaga, 1963, 1966). Formal, published excavations have not been conducted in the nearby art cave of Cobrantes, but it is known to contain a substantial archaeological site and there are small collections of Upper Palaeolithic stone tools and decorated antler points that are probably of Magdalenian age, in line with the style of the parietal engravings (Rasines, 2000; Yudego, 1995).

In contrast to these two very low, sheltered, mid-size caves of the Aras Valley, the sites of La Fragua and El Perro recently excavated by González Morales (1990, 1995, 1998, 1999, 2000; González Morales & Diaz, 1992, 2000; González Morales *et al*., 1992) are respectively a very small cave and a narrow rock shelter in very strategic (but rather exposed) positions on Monte Buciero, overlooking the Asón and what would have been during the Tardiglacial an exposed strip of continental shelf some 3–5 km wide. The lowest level in La Fragua has a small artefact assemblage (including an antler wand with an engraving of a horse and débitage) and a few macrofaunal remains. The stone artefacts are of an excellent-quality black flint—probably from the Plentzia limestone formation which outcrops along the modern shore 9 km to the east, but which may have been available nearer to Monte Buciero on the now-flooded continental shelf. This level in La Fragua is so far undated, but is likely to be of early Magdalenian age.

The lowest archaeological level in El Perro dates to 12,140 ± 180 BP (Table 1). It has a small lithic assemblage—also on the excellent local black flint—and a bone industry including an eyed needle and several antler sagaies, some of which are decorated. There are only a few marine molluscs (limpets). The macrofaunal remains from both sites (currently under study) include the same range of game species as in Otero and Chora, with particularly many red deer together with ibex, which is not surprising given the proximity of these rocky slope sites to the coastal plain.

About 16 km upstream of the sites at the present mouth of the Asón, lies the vast, historic cave site of El Valle at the base of the broad, deep valley of Rasines. Although harbouring a key stratigraphic sequence for the Upper Magdalenian and Azilian of northern Spain and a wealth of magnificent portable art objects—including numerous harpoons, a very famous *bâton de commandement* with an engraved hind head, and a bird radius with engravings of horses, a stag and fish (Obermaier, 1924: Figures 66 and 67)—El Valle was never published beyond brief preliminary notes prior to World War I (Breuil & Obermaier, 1912, 1913). A portion of its important collections was analysed by Cheynier and González Echegaray a half-century later (1964), and again by González Sainz (1989). Repeatedly looted ever since, El Valle was recently the object of systematic testing by García-Gelabert (2000), which resulted in the discovery of important remnant areas of intact stratigraphy.

Although it is difficult to correlate the four pits dug by García-Gelabert, one can reconstruct the following general sequence: the lowest level reached in one small *sondage* yielded a radiocarbon date of 13,820 ± 610 BP; above this in two of the *sondages* is a horizon with typical Upper Magdalenian round-section, unilaterally barbed antler harpoons, a decorated antler *bâton de commandement*, an engraved bone and several antler points, along with characteristic lithic artefacts; this

Table 1. Radiocarbon determinations from the Asón Estuary area

Site	Level	Period	Material	Date	± 1 s.d.	Lab no.
Perro	2c	UM	Charcoal	12,140	180	GrN-20962
Perro	2a/b	AZ	Charcoal	10,160	110	GrN-18116
Perro	1·3	Meso	Charcoal	9260	110	GrN-18115
Fragua	3	AZ	Charcoal	9600	140	GrN-20966
Fragua	1 low	Meso	Charcoal	7530	70	GrN-20965
Fragua	1 mid	Meso	Charcoal	6860	60	GrN-20964
Fragua	1 up	Meso	Charcoal	6650	120	GrN-20963
Chora	Conch	Meso	Charcoal	6360	80	GrN-20961
Trecha	1	Meso	Shell	7000*	70	URU-0038
Trecha	Conch	Meso	Shell	5740*	100	URU-0039
Trecha	Conch	Meso	Charcoal	5600	310	URU-0051
Trecha	Conch	Meso	CaCO3	5430	70	URU-0050
Ilso de Hayas	Hearth	Meso	Charcoal	8440	130	GrN-21231
Hayas Mound	1	Neo	Charcoal	5490	120	GrN-21232

*500 years subtracted to correct for marine reservoir effect. UM = Upper Magdalenian; AZ = Azilian; Meso = Mesolithic; Neo = Neolithic; conch = "conchero" (shell midden). All are conventional radiocarbon determinations.

Table 2. Radiocarbon determinations from El Valle cave (Rasines, Cantabria)

Test pit	Level	Period	Material	Date	± 1 s.d.	Lab no.
G1	Surface	AZ?	Charcoal	10,120	280	GX-24639
G1	1	UM?	Charcoal	13,820	610	GX-24640
GIC2	II.2	AZ	Charcoal	11,130	170	GX-24638
GDSS	I	AZ	Charcoal	11,040	150	GX-23798
GDSS	I	AZ	Charcoal	11,050	150	GX-23799

All are conventional radiocarbon determinations.

is overlain in three of the *sondages* by levels artifactually attributable and dated by several radiocarbon determinations to the Azilian (Table 2). According to the analyses of A. Morales and associates, the macromammalian faunas from the Upper Magdalenian units are overwhelmingly dominated by red deer, with small quantitites of roe deer, ibex and bovines. Young and sub-adult red deer were preferentially hunted, and many of the game were killed in late winter during the Magdalenian. There are traces of birds, fish and microfauna. El Valle is on a par with such sites as La Paloma, El Castillo, El Pendo, Isturitz, Duruthy, Mas d'Azil or La Vache in terms of a wealth of Magdalenian works of "art"—often decorated "functional" artefacts.

El Mirón Cave is in an absolutely dominant, strategic location on a cliff *c*. 100 m above the confluence of the Ríos Calera, Gándara and Asón at the eastern end of the intermontane valley—clearly an important place in the Upper Palaeolithic landscape, given the number of sites clustered here. In fact, the Ramales cluster is reminiscent of the concentration of sites in Monte Castillo in Puente Viesgo—even including the striking similarity to Monte Castillo of prominent, pyramidal-shaped Pico San Vicente, directly in front of El Mirón. Mirón is a large, straight cave, consisting of a vast, west-facing mouth (*c*. 16 × 20 m), an ample, well-sheltered and lit vestibule (30 × 8 × 13 m), a narrow passage (30 × 4 m) with a steep slope rising back to the dark inner cave (70 × 7 m),which is filled (ultimately all the way to the ceiling) with ancient alluvium and flowstone. Magdalenian levels have been encountered in excavations throughout the vestibule and even in a test pit in the inner cave. The vestibule excavations consist of two *c*. 10 m^2 blocks at the front and rear, connected by a 1 m wide, dog-legged trench, the total constituting a 16 m-long transect. The Magdalenian occupations are by far the richest and most extensive to have been found in El Mirón, testifying to the intensity/frequency of human habitation here (as throughout the whole Asón valley) during the Tardiglacial. The Magdalenian is dated in the site by 20 radiocarbon dates that come from all four excavation areas and range from 17 to 12 kya—the entire span of this traditional culture-stratigraphic unit (Table 3). Results of MS (magnetic susceptibility) measurements of Mirón sediments (Ellwood *et al.*, 2001) point to marked variability in temperature and humidity throughout the Tardiglacial, with episodes of post-LGM climatic moderation even before Bölling, a finding which is in line with traditional palynological interpretations in the Cantabrian region (e.g., Leroi-Gourhan, 1980, 1986; *pace* Sánchez Goñi, 1991, 1994). Micromorphological and MS analyses have

Table 3. El Mirón cave radiocarbon dates (1996–2001)

Sq.	Zone	Level	Spit	Period	Date BP	1 S.D.	Material	Lab no.	Method	Calibrated date*
H2	OV	3	4	BA	3700	40	Ch	GX-25851	AMS	2140–2030 BC
J2	OV	5	3	Chal	3820	240	Ch	GX-22127	Conv.	2575–1931 BC
I3	OV	5·1	4	Chal	4120	50	Ch	GX-22130	AMS	2858–2586 BC
H2	OV	7	14	Chal	3740	120	Ch	GX-24460	Cxcnt	2305–1963 BC
I3	OV	8·1	13	Neo?	4680	60	Ch	GX-22131	AMS	3612–3371 BC
J2	OV	9	8	Neo	5170	170	Ch	GX-22128	Conv.	4221–3789 BC
H4	OV	9	22	Neo	5280	40	Ch	GX-24461	AMS	4217–4001 BC
I4	OV	9·6	22	Neo	5250	150	Ch	GX-24462	Cxcnt	4318–3945 BC
I3	OV	10	19	Neo	5570	50	Ch	GX-23414	AMS	4449–4359 BC
I3	OV	10	19	Neo	5690	50	Ch	GX-23413	AMS	4582–4458 BC
J4	OV	10·1	34	Mes	8380	175	Ch	GX-24463	Cxcnt	7586–7182 BC
I4	OV	10·1	28	Mes	8700	40	Ch	GX-25852	AMS	7745–7609 BC
I4	OV	10·1	29	Mes	9550	50	Ch	GX-24464	AMS	9119–8792 BC
I3	OV	11·1	25	AZ/UM	11,720	140	Bc	GX-23391	Conv.	12,039–11,523 BC
J2	OV	12	12	UM	12,970	70	Ch	GX-22132	AMS	13,990–13,299 BC
I3	OV	15	43	LM	15,010	260	Bc	GX-23392	Conv.	16,396–15,609 BC
I3	OV	15	43	LM	15,220	300	Bc	GX-23393	Conv.	16,679–15,810 BC
I3	OV	16	44	LM	15,180	100	Bc	GX-23415	AMS	16,487–15,910 BC
J3	OV	17	32	LM	15,470	240	Bc	GX-24466	Conv.	16,919–16,145 BC
J3	OV	17	39	LM	15,450	160	Bc	GX-27115	Conv.	16,852–16,184 BC
J2	OV	17	20	LM	15,700	190	Ch	GX-25853	Cxcnt.	17,151–16,441 BC
O6	MV	302?	Pit98-a	Neo?	4910	80	Ch	GX-28211	Conv.	3773–3641 BC
L5	MV	303	13	Neo	5500	90	Ch	GX-25854	Conv.	4451–4250 BC
L5	MV	303·1	14	Neo	5520	70	Ch	GX-25855	Conv.	4451–4261 BC
L5	MV	303·3	16	Neo	5790	90	Ch	GX-25856	Cxcnt.	4768–4540 BC
P6	MV	305	9	AZ	10,270	50	Bc	GX-24467	AMS	10,362–9818 BC
P6	MV	306	11	AZ/UM	11,650	50	Bc	GX-24468	AMS	11,861–11,525 BC
P6	MV	308	16	UM	12,350	180	Ch	GX-28210	Cxcnt.	13,403–12,166 BC
U7	VR	Surface*		Med	540	100	Ch	GX-24465	Cxcnt.	AD 1304–1442
T8	VR	102·1	3	AZ/UM	11,950	70	Bc	GX-23417	AMS	12,136–11,890 BC
V8	VR	108	4	MM	13,660	70	Bc	GX-22703	AMS	14,689–14,209 BC
V8	VR	108	5	MM	14,710	160	Bc	GX-23397	Conv.	15,969–15,346 BC
T10	VR	108	8	MM	14,850	60	Ch	GX-27114	AMS	16092–15,559 BC
V8	VR	110	8	MM	16,130	250	Bc	GX-23396	Conv.	17,699–16,884 BC
V8	VR	111	14	MM	16,370	190	Bc	GX-23395	Conv.	17,935–17,201 BC
U7	VR	111	20	MM	15,530	230	Bc	GX-24469	Conv.	16,981–16,221 BC
T10	VR	114	17	LM	16,460	50	Bc	GX-28209	AMS	17,989–17,364 BC
V8	VR	115	19	LM	13,800	840	Bc	GX-23394	Conv.	15,725–13,517 BC
V8	VR	116	20	LM	15,220	100	Bc	GX-23416	AMS	16,534–15,955 BC
V8	VR	117	24	LM	17,050	60	Ch	GX-25857	AMS	18,760–18,031 BC
V8	VR	119	28	LM/Sol	16,960	80	Ch	GX-25858	AMS	18,570–17,923 BC
W10	VR	125	4	Sol	18,980	360	Bc	GX-24470	Conv.	21,106–20,035 BC
W10	VR	126	5	Sol	18,950	350	Bc	GX-24471	Conv.	21,065–20,007 BC
X10	VR	128	20	EUP	27,580	210	Ch	GX-27113	AMS	
X10	VR	130	36	MP	41,280	1120	Ch	GX-27112	AMS	
Slope	Top	IC	Flowstone	AZ	10,740	40	Ta	GX-27521a	AMS	10,984–10,699 BC
Slope	Top	IC	Flowstone	AZ	10,390	50	Tc	GX-27521c	AMS	10,665–10,024 BC
8-9Q	IC	IV		Med	900	80	Ch	GX-22129	Conv.	AD 1040–1204
11Q	IC	VII		BA	3230	40	Ch	GX-28013	AMS	1523–1441 BC
11R	IC	VIII	10	MM	14,620	80	Ch	GX-22347	AMS	15,818–15,290 BC

IC=Inner cave; AMS=Accelerator; Ch=Charcoal; Ta=Tooth bioapatite; Tc=Tooth collagen; OV=Outer vestibule ("Cabin"); Conv.=Conventional; Bc=Bone collagen; VR=Vestibule rear ("Corral"); Cxcnt.=Extended count *Stuiver *et al.*, 1998: CALIB 4.1.2; MV=Mid-vestibule ("Trench"); (Range@1 sigma).

*Large lump of charcoal apparently fallen into the excavation from Corral area surface after removal of top *c.* 20 cm of recent dirt and dung. Med=Medieval; BA=Bronze Age; Chal=Chalcolithic; Neo=Neolithic; Mes=Mesolithic; AZ=Azilian; UM=Upper Magdalenian; MM=Middle Magdalenian; LM=Lower Magdalenian; Sol=Solutrean; EUP=Early Upper Palaeolithic; MP=Middle Palaeolithic. (Distinctions between Azilian and Upper Magdalenian and between Middle and Lower Magdalenian are tentative.)

detected the abrupt climatic downturn of Dryas III at the close of the temperate Bölling/Alleröd phase in the Upper Magdalenian-Azilian range of layers at the front of the Mirón vestibule (Courty & Vallverdu, 2001).

Although present (and emblematically represented by a single, unilaterally barbed antler harpoon fragment), the late Magdalenian is relatively poor in the Mirón vestibule, with localized clusters of finds and hearths. By far the densest levels in terms of artefacts,

Table 4. Radiocarbon dates from Horno and Tarrerón caves

Site	Level	Period	Material	Date	± 1 s.d.	Lab no.
Horno	Surface	AZ	Bone	11,630	170	GX-26410
Horno	1	UM	Bone	12,530	190	GX-27457
Horno	2	UM	Bone	12,250	190	GX-27456
Tarrerón	III	Meso	Charcoal	5780	120	I-4030

All are conventional radiocarbon determinations.

manuports, features and faunal remains pertain to the early-middle Magdalenian, centred on *c.* 16–14 kya: Dryas I. Unlike in the late Magdalenian range of deposits, there are no archaeologically sterile layers or zones here. These levels are very rich in antler points (many engraved with grooves or ''tectiform'' designs typical of the Cantabrian mid-Magdalenian), bone needles, perforated teeth and shells. They are also packed with lithic artefacts, including abundant (largely non-cortical) débitage, small, exhausted cores, typical retouched tools (e.g., endscrapers, burins, perforators, knives) and especially microlithic weapon elements (i.e., backed bladelets, which make up around half of some of the tool assemblages). The flints used are non-local and many (the fine, grey and black ones) come from the Lower Cretaceous Plentzia formation that outcrops along the present shore. However, some early Magdalenian levels contain numerous macrolithic artefacts (e.g., large flakes, notches, denticulates, sidescrapers) made on materials available in the beds of the rivers immediately below the cave (quartzite, lutite). The early-mid Magdalenian levels have hearths (or remnants thereof), at least one pit and a possible wall. Faunal remains (not yet analysed) are manifestly dominated by ibex (including many large horn cores and mandibles), followed by red deer, with small quantities of horse, bovine and other animals of chamois/roe deer size. Salmon and trout remains are common, and there are a few non-perforated marine mollusc shells (limpets, periwinkles) attesting—like the flint—to visits to the Tardiglacial shore, which would have be a long day's walk from Mirón. The evidence from Mirón adds considerable weight from other, much smaller, more specialized sites that humans were making considerably more substantial use of the montane habitats of the Cantabrian Cordillera (as in the Pyrenees) during the early-mid Magdalenian than in the early Upper Palaeolithic, probably in part due to the recession of the mountain glaciers that was occurring after the LGM during Dryas I (see Straus *et al.*, 2000).

One of the most interesting discoveries so far during the on-going research in El Mirón is a huge block that is decorated with lineal engravings. The block fell from the angle between the ceiling and the vestibule rear wall, landed on 16,000-year-old (uncal.) early Magdalenian Level 110, was then engraved, and finally, progressively and almost completely covered over by middle and late Magdalenian, Azilian and Mesolithic-age sediments (González Morales & Straus, 2000). Other engravings—including a horse image of ''Magdalenian'' style—are being found on the walls of the vestibule rear at heights which would make sense if they had been made by people standing on *Magdalenian-age* ground surfaces. In sum, in terms of the finds density and diversity, features, penecontinuity and spatial extent of the early-middle Magdalenian occupations—coupled with the evidence of rock art—Mirón was clearly a major, multi-purpose site during this period, reminiscent of and with engraved antler decorative similarities to such significant regional residential sites on or at the edge of the coastal zone as Altamira, Juyo and Castillo, despite its obvious locational and related functional distinctiveness (i.e., montane hunting of ibex versus lowland red deer slaughter).

Seemingly complementary to El Mirón during the late Magdalenian is the much smaller cave of El Horno at the base of the same mountain. Limited-scale excavations since 1999 by M.A. Fano have revealed an intact archaeological deposit corresponding to the terminal Magdalenian and consisting of two levels with two statistically indistinguishable radiocarbon dates of 12·5 and 12·25 kya for levels 1 and 2 respectively (Table 4). Occupation of the cave seems to have begun in the Tardiglacial, since Level 3, which is sterile, lies atop bedrock. Level 2 is especially rich in archaeological material, notably two harpoons similar to ones in Valle and Chora, as well as fragments of a needle, an awl and an antler point and portable art objects.

This evidence seems to suggest that, in contrast to the fairly scanty human occupation of nearby Mirón during the terminal Magdalenian, Horno witnessed intense utilization. From the adaptational standpoint, we will only be able to propose explanatory hypotheses for the near-abandonment of the large, high cave in favour of the small, low Horno Cave once studies of the paleoenvironment and of the relative habitability of two caves have been completed (Fano, 2001).

So far only one other site in the upper Asón has yielded any potential Magdalenian material: Cubera rockshelter, which is actually in the highest, south–north, gorge section of the valley, above the town of Arredondo. There, in backdirt, speleologists found unspecified flint artefacts, abundant faunal remains, and an engraved rib which *could* be of Magdalenian

age (Chaline, 1965: 25–26, Figure 5). Other indirect evidence for the intensity of human use of the upper Asón valley includes such cave art sites as Cullalvera in Ramales and Los Emboscados and Patatal in the Matienzo depression. The first two are attributed stylistically to the Magdalenian (González Echegaray & González Sainz, 1994), although their deposits have not yet been dug.

The Azilian Continuum

All the well-known Magdalenian sites in the Asón valley witnessed continuation of human use in the Azilian, which is an "Epi-Magdalenian" existing during late Alleröd, Dryas III and Preboreal. Simplified in terms of lithic and bone artefacts, poor in portable "art", apparently devoid of parietal art, the Azilian assemblages are generally characterized by having many small ("thumbnail") endscrapers, backed bladelets and points, few burins or other specialized lithic tools, flat- (as opposed to round-) section harpoons (very rarely decorated) and few other bone/antler artefacts (save awls). Such is the case with the Asón assemblages dating to <c. 11·75 kya. Re-analyses of numerous artefact assemblages dating to the end of the Last Glacial in the Vasco-Cantabrian region confirm the continuity of so-called terminal Magdalenian and Azilian (e.g., González Sainz, 1989). Some even suggest the utility of creating a concept of an "early Azilian" with such Magdalenian "holdovers" as occasionally decorated harpoons and bone plaquettes or spatulae with distinctive "tick-marked" motifs (e.g., González Sainz, 1982; Adan *et al*., 2001). The continuity in settlement pattern that is apparent in the Asón is characteristic of the whole Vasco-Cantabrian region (as well as the French Pyrenees), although many Azilian occupations are smaller than their Magdalenian predecessors (e.g., Straus, 1995, 1996; Aura *et al*., 1998).

In the lower Asón, both Chora and Otero are believed to have had Azilian components, although undated and poorly distinguished from the underlying final Magdalenian (González Sainz, 1989). Marine molluscs are abundant. Fragua and Perro have distinct Azilian layers, rich in molluscs. The Perro Azilian shell midden is divided into two layers, the upper of which is dated to 10,160 BP. The midden was composed mainly of limpets (*Patella*) and periwinkles (*Littorina*) and yielded two diagnostic flat-section harpoons. The level above the Magdalenian deposit in Fragua produced only a few non-diagnostic artefacts along with land-snails and bone fragments, but it was dated by radiocarbon to 9600 BP, which is equivalent to the late Azilian. The macro-mammalian faunas from these sites continue to be dominated by red deer (González Morales *et al*., 1992). Wood charcoal samples indicate that reforestation was well underway in early Preboreal times and that humans were probably making significant use of newly available plant foods.

The site of El Valle (historically second only to the type site of Mas d'Azil in the French Pyrenees and now matched in importance in Spain only by Los Azules in Asturias) provided a key stratigraphic record for the historic establishment of the developmental sequence from the Magdalenian to the Azilian, bringing the Upper Palaeolithic right up to and slightly beyond the end of the Pleistocene and thereby helping to "fill" the so-called "Hiatus" between Palaeolithic and Neolithic. The recent testing in Valle by García-Gelabert confirms and dates the sequence, while providing new data from screened excavations on Azilian assemblage contents. Azilian materials associated with radiocarbon dates were found in three *sondages*. The dates range from 11,130–10,120 BP. There are numerous lithic artefacts, mammalian remains (heavily dominated by red deer), land snails, a perforated red deer canine, and several *Littorina* shells, attesting to visits to the shore. Unlike in the Magdalenian faunal assemblages, axial elements are scarce, according to the archaeozoological team led by A. Morales. This might suggest that carcass butchery took place off-site (or in other, non-sampled parts of the cave) during the Azilian. Preliminary analyses indicate Azilian occupations at different seasons of the year—unlike the more winter-focused late Magdalenian occupations. Fairly uncharacteristic for the Azilian, but very reminiscent of the huge Azilian deposit in Mas d'Azil (Bahn, 1984), the Valle Azilian occupations seem to have been very intensive *and* extensive, spilling over from the more habitable east chamber into the even wetter, draftier south chamber, through which the Río Silencio flows.

At El Mirón there are a series of radiocarbon dates between 11·7–10·3 kya in the front and mid-vestibule and from a tooth (next to a flake) adhering to the bottom of a flowstone remnant cemented to the cave wall above the slope leading back to the inner cave. There is, in addition, a localized hearth lens in the vestibule rear that is dated to 11,950, placing it in the period of transition between the terminal Magdalenian and early Azilian. The main levels chronologically assignable to the Azilian are a series of charcoal-rich layers in the outer vestibule, which, like the mid-vestibule, have yielded several backed micro-points and small endscrapers, but few other formal tools. No Azilian harpoons have been found and faunal remains are fairly scarce.

Again as a complement to the relative poverty of Mirón in this Pleistocene-Holocene transition period, Horno Cave has evidence of a significant Azilian occupation, despite its relatively small size. Spelunkers had originally found a flat-section, bilaterally-barbed, Azilian harpoon while digging a passage trench into the rear of the cave (Federación Cántabra de Espeleología, 1995). Fano's recent excavations have produced numerous small endscrapers and backed bladelets from a partly disturbed surficial layer, which also provided a radiocarbon date of 11,630 BP on bone. This is the probable context of the harpoon.

Thus the human occupation of the whole Asón valley begun in the Magdalenian clearly continued in the Azilian, despite the onset of the trend toward Preboreal reforestation. Movement between coast and mountains seems to have been continued as the basis for the settlement system. Similar patterns of subsistence seem to have been maintained, since shellfish were already present in significant numbers in the late Magdalenian layers at Chora and Otero—and in trace quantities in Mirón. It is likely that woodland-adapted ungulate species (roe deer, boar and chamois) were taking on increased importance, despite the continued dominance of red deer on the coastal plain and valley floors and of ibex on the steep, rocky slopes of the montane zone. The roles of horse and bison were probably diminishing, although aurochs may have grown in importance. At any rate, these are hypotheses in need of testing as the faunal analyses from the new excavations—with radiocarbon and finer stratigraphic controls than were maintained at Otero and Chora—are done in coming years. The Magdalenian-Azilian settlement continuum is typical thoughout the region. The situation changed radically during the Boreal and early Atlantic phases: the Mesolithic.

The Mesolithic Epilogue

González Morales' "Asón Estuarine Marshes Project" has documented and dated a wealth of Mesolithic shell midden sites. As the sea level rose to and even slightly above its present position during the Boreal and Atlantic phases, the modern littoral and Asón estuary were created. The general warming of ocean water and local change in substrate at the river mouth led to changes in marine molluscan contents *vis à vis* the Azilian, namely the massive appearance of oysters and mussels, in addition to topshells and different species of limpets. El Perro has a transitional early Mesolithic midden deposit dating to 9260 BP, while La Fragua has a stratified sequence ranging from 7530 to 6860 to 6650 BP. A midden remnant with a similar spectrum of Holocene molluscan taxa has recently been identified and dated to 6360 BP in La Chora (Yudego, 1995). Another cave, La Baja, across the estuary from Monte Buciero, also contains a shell midden of apparent Mesolithic age, and there are probably others. As is typical in shell middens along the Atlantic shores of Iberia (and elsewhere in Europe), artefacts are rare and generally very simple. Other Mesolithic sites in the general vicinity include Ilso de Hayas, an open-air campsite on a ridge above the Asón estuary, which has been dated to 8440 BP, and La Trecha Cave, where a shell midden deposit was formed between *c*. 7000 and 5500 radiocarbon years ago (correcting for the marine reservoir effect in two dates on shell for the lower part of the deposit). The top of the shell midden at La Trecha, which is on the shore of another estuary 12 km east of the Asón, lacks ceramics, but was formed contemporaneously with the early Neolithic occupations of the Vasco-Cantabrian region—including megaliths above the Asón and occupation levels in El Mirón.

In striking contrast to the density of sites clustered around the estuary (a situation typical of many stretches of the Vasco-Cantabrian coast—notably in the case of the so-called Asturian culture in eastern Asturias and western Cantabria, e.g., Fano, 1998) the middle and upper zones of the Asón valley are nearly devoid of evidence for human occupation during the Mesolithic (see Straus & González Morales, 2002; González Morales *et al.*, n.d.). There is no known Mesolithic in either Valle or Horno. However, in the Matienzo depression above the intermontane stretch of the Asón valley, a recent excavation in the small cave of Cubio Redondo has uncovered a landsnail midden with a few lithic artefacts (including a double-bevel retouched circle segment and a backed point), but no ceramics; there are wild ungulate and bird remains. This deposit has dates of 6630 BP on bone and 5780 BP on charcoal (Ruiz Cobo *et al.*, 1999; González Morales *et al.*, n.d.).

There are major depositional hiati in Mirón between *c*. 11·7–9·5 kya and between *c*. 8·4–5·7 kya. The intervening pre-Neolithic deposit, which is continuous from the vestibule rear to front, was formed under very humid conditions. It contains small numbers of flakes and bone splinters—enough to indicate some ephemeral human visits to the cave during the early Mesolithic. It is possible that the interior was less attractive to humans than the coast during the Boreal and early Atlantic because the latter, with ecotonal estuaries, was extraordinarily rich in food resources.

The only indication of a terminal Mesolithic occupation in the intermontane valley is the small cave of Tarrerón, about 2 km upstream of Mirón. Here, over 30 years ago, Apellániz (1971)—below a layer of Chalcolithic burials—found a small lithic artefact assemblage including a double-bevel retouched circle segment and a handful of other tools and débitage, a bone awl, but no ceramics or domesticated animals. This level is dated to 5780 BP—contemporaneous with the earliest Neolithic (with well-developed ceramics and domesticated animals—mostly ovicaprines) in Mirón, and soon followed by the construction of megaliths along ridges above the Asón (e.g., Serna, 2000). Thus, the Asón hinterland only seems again to have become attractive to humans with the appearance of a food production economy late in the Atlantic phase. This is true of much of the Vasco-Cantabrian region in general, as it shifted from being a dynamic cultural center in the Upper Palaeolithic world of western Europe to becoming a peripheral part of the Mediterranean Neolithic world.

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