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# Environmental and cultural changes across the Pleistocene-Holocene transition in Cantabrian Spain

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ABSTRACT

A review of the cultural evidence from northern coastal Atlantic Spain (a.k.a., Vasco-Cantabria) spanning the late Last Glacial and early Postglacial (from Greenland Interstadial 1 to the mid-Holocene) reveals that some changes may have been related to major climate/environmental changes, while others may be attributed to demographic factors that caused possible resource overexploitation and to historical factors such as the long-term availability of Neolithic domesticates and technology in adjacent regions. The culmination of the warming trend of the Last Glacial Interstadial in the Allerød seems to have been of particular importance in the transition from the classic Upper Magdalenian (with its rupestral and portable art and complex stone and bone technologies) to the Azilian, despite continuity in the main game species and in the process of subsistence intensification. The Younger Dryas, on the other hand, seems to have had little immediate direct repercussion in this region, as the Azilian continued, straddling the Pleistocene-Holocene boundary. On the other hand, the climatically non-dramatic Preboreal-Boreal boundary seems to have seen the abrupt, marked break between the "Epimagdalenian" Azilian and the Asturian coastal shell midden Mesolithic in the western sector of the region. This contrasted with greater technological continuity (albeit with similarities to the Sauveterrian tradition in adjacent SW France) in the Mesolithic of the Basque Country, with no archeological indications that the 8.2 cal kya event had important consequences in this region. Then, some 15 centuries later, came the sudden, but centuries-delayed appearance of Neolithic domesticates and ceramics on the Atlantic side of the Cantabrian Cordillera originating from sources in the Mediterranean environments of the upper Ebro basin and/or southern France. This major lifeway change was possibly finally accepted, within a still mixed economy, in the face of the overexploitation of wild food resources. The "neolithization" of Vasco-Cantabria was finally underway by c. 6.6 cal kya, quickly leading to new human-land relationships characterized by mainly ovicaprine pastoralism, apparently limited cereal agriculture, continued foraging, recolonization of the montane interior and the construction of modest megalithic monuments.



## 1. Introduction

Cantabrian Spain (a.k.a., Vasco-Cantabria: the modern autonomous regions of Asturias, Cantabria and the coastal Basque provinces of Vizcaya and Guipúzcoa, plus the northernmost part of Navarra) was occupied by hominins at least since late Middle Pleistocene times and was a relatively densely populated refugium during the Last Glacial Maximum of MIS 2 (Straus, 1992, 2015). Large numbers of deeply stratified cave sites attest to apparently continuous human occupation of at least the coastal lowland strip just north of the 43rd parallel of latitude along the Bay of Biscay (Cantabrian Sea) throughout the Upper Paleolithic and Mesolithic. The purpose of this article is to review possible relationships between the major climatic (and hence environmental/resource) shifts of the last millennia of MIS 2 and the first millennia of MIS 1, and the archeological manifestations of cultural changes that spanned the Pleistocene-Holocene transition in this classic prehistoric culture area. It builds on and updates earlier reviews by the author on the subject (e.g., Straus, 1996, 2011; Aura et al., 1998; Straus and González Morales, 2012a), particularly in light of the recent, ice core-based, chrono-climatic framework and calibrated radiocarbon dates (e.g., Rasmussen et al., 2014).

Along with northernmost Portugal and Galicia to the west and the Pyrenees to the east, Vasco-Cantabria is part of a narrow belt of the Euro-Siberian ecological zone along the northern edge of Iberia,

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the vast remainder of the Peninsula being in the Mediterranean zone. From the archeological perspective, it stretches some 350 km east-west from the French border at the Bidasoa River, where the Pyrenees abut the Cantabrian Cordillera, to the Nalón River in central Asturias, where karstic (i.e., cave-rich) limestone bedrock—and hence an Upper Paleolithic record–nearly ends. The distance between the Holocene shore and the Cordilleran crest line is generally no more than about 50 km, and often less. The region would have been about 5–12 km wider under conditions of full glacial sea level regression. The highest summits (in the Picos de Europa of eastern Asturias and western Cantabria) reach above 2500 m and the crests and passes are generally lower in the eastern (Basque Mountains) sector than in the west. Mountain glaciers dotted the Cordillera during late MIS 3 and MIS 2 (Rodríguez-Rodríguez et al., 2015; Serrano et al., 2015)(Fig. 1). The climate is quintessentially oceanic, but one of the key differences between glacial and interglacial conditions was the absence of Gulf Stream warm water flow into the Bay of Biscay during the former. Aridity was always a very relative phenomenon even during cold times.

Archeologically, the period under consideration here includes the normative culture-historical periods known as the Upper Magdalenian, Azilian, Asturian and other contemporaneous Mesolithic cultures (sometimes called "Sauveterrian"), corresponding to the late Last Glacial and early Postglacial (i.e., the classic Bølling, Older Dryas, Allerød, Younger Dryas, Preboreal, Boreal and early Atlantic phases or pollen zones [Mangerud et al., 1974]). It is bracketed culturally by the Lower/Middle Magdalenian in the Oldest Dryas and the Neolithic in the late Atlantic (see Straus, 1992).

### 1.1. The paleoclimatic background

Following the Last Glacial Maximum (ca. 25-20 cal kya—incorporating Heinrich 2 plus Greenland Interstadial [GI] 2 and Greenland Stadial [GS] 2c) and Oldest Dryas (GS 2b and 2a), the ice core record (which largely supports the classic pollen record for Western Europe) shows a warming trend within GS 2b punctuated by colder conditions in GS 2a (16.9–14.7 kya) plus Heinrich 1(Naughton et al., 2007; González-Sampériz et al., 2006; Rasmussen et al., 2014). The dramatic Terminal Pleistocene warming began in GI 1e-1c3 (~Bølling), 14.7–13.6 cal kya. The upturn was momentarily interrupted in GI 1c2 (~Older Dryas) and GI 1c2, but included two warm episodes (GI 1c1 and GI 1a) that are together equivalent to the classic Allerød pollen zone (13.9–12.9 kya)—itself interrupted by a short cooling episode (GI 1b or c). Younger Dryas is equivalent to GS 1(12.9–11.7 kya)(Björck et al., 1998; Hemming, 2004; Andersen et al., 2006; Svensson et al., 2008; Eynaud et al., 2009; but see Rasmussen et al., 2014 for slight modifications). The major warming trend of the early Holocene (Preboreal and Boreal, whose boundary was at around 9.6 cal kya) was interrupted by the so-called "8.2 kya Event" (maximally 8.6–8.0 kya)(Alley and Agústsdóttir, 2005; Rohling and Pälike, 2005; Thomas et al., 2007), whose cooling, drying effects were mainly felt in North Atlantic regions. This was immediately followed by the very warm Atlantic phase. In short, the Pleistocene-Holocene transition was a ca. 10-millennium period of extreme climatic instability within an ultimate, overall trend toward interglacial conditions. How was this manifested regionally in northern Atlantic Spain? Proxy data from marine cores, pollen spectra and micromammalian assemblages are still fairly sparse, uneven and incomplete, but an overall picture can be painted.

Heinrich Event 1 is characterized in marine cores off Galicia by a spike in ice rafted detritus, significant representation of polar foraminifera and high $\delta$18O values (Naughton et al., 2007). On land, in pollen cores the beginning of H1 displays an expansion of heathland, overall woodland regression but with an increase in ferns indicating cold, humid conditions. These conditions gave way to drier, but somewhat less cold ones in the last part of H1, with an increase in semi-desert (steppe) plants (Naughton et al., 2007). Generally the Late Glacial in northern Atlantic Spain is characterized palynologically by open environments (heaths, grasslands) dotted with pines and junipers, accompanied at certain times and places by some oaks, birches and other deciduous trees (as confirmed by wood charcoal analyses from archeological sites). The Bølling interstadial ((GI 1e-c3—14.8–13.6 cal kya) witnessed a marked increase in mixed deciduous-coniferous woodlands, albeit with a significant temperature downturn in GI 1d). The cooling episode of the so-called Older Dryas (GI 1c2—13.6 cal kya) was rather attenuated in Cantabrian Spain and was followed by a period of very humid, temperate, albeit variable conditions equivalent to Allerød. The trend toward increasingly temperate woodlands at the end of this period was interrupted by increases in steppe vegetation in Younger Dryas (12.9–11.7 cal kya), albeit with the persistence of trees in the complex relief of this region that always favored mosaic

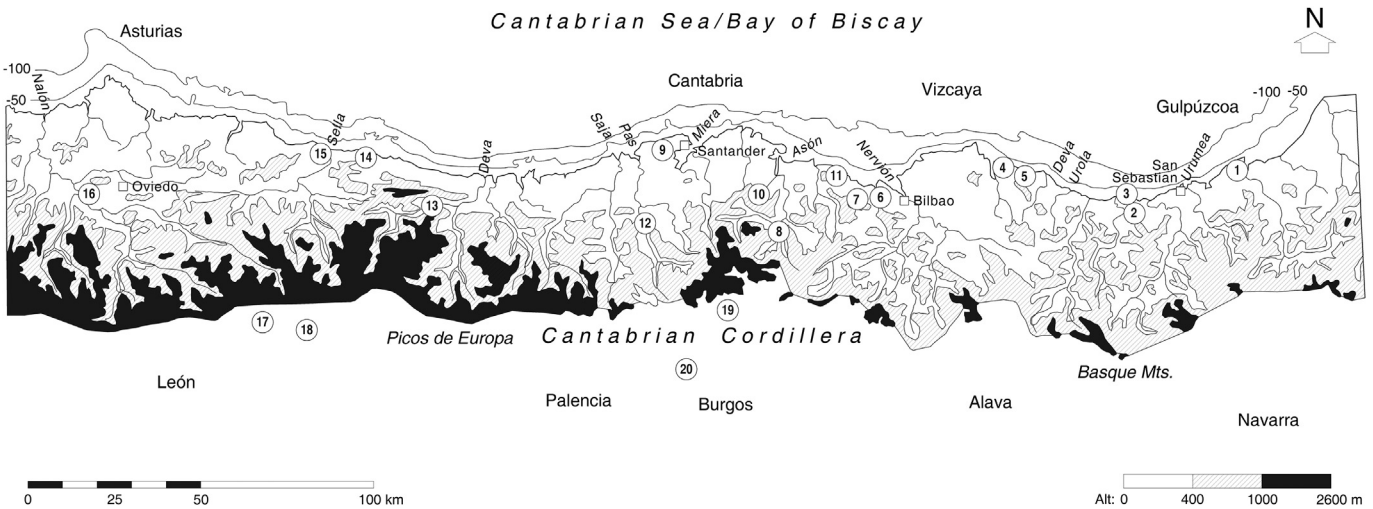


**Fig. 1.** Map of Vasco-Cantabrian Spain plus adjacent trans-cordilleran provinces, showing the locations of sites mentioned in the text. 1. Rockshelter J3; 2. Marizulo; 3. Herriko Barra; 4. Kobaederra; 5. Lumentxa; 6. Pico Ramos; 7. Arenaza; 8. El Mirón, Cullalvera, El Valle, El Horno; 9. El Juyo; 10. Cubio Redondo; 11. Los Gitanos, Arenillas; 12. Las Monedas; 13. Los Canes; 14. La Riera; 15. Les Pedroses; 16. Las Caldas; 17. La Braña; 18. La Uña, Espertín; 19. Ojo Guareña; 20. Níspero.

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