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Human response to Holocene warming on the Cantabrian Coast (northern Spain): an unexpected outcome

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ABSTRACT

Subsistence was characterized during the Pleistocene to Holocene transition on the Cantabrian Coast (northern Spain) by a progressive diet widening, with a greater exploitation of marine environments and a more intense consumption of low-ranked species. This trend was also accompanied by a general and noticeable decrease in the amount of ungulates that were recovered from a set of archaeological sites clearly dominated by shells. The causes behind this change in the economic practice of the last hunter–gatherer groups are still being debated. There are currently two opposing views on the matter, with some scholars defending the role of demographic pressure as the main driving force, while other researchers invoke the importance of the environment in the food procurement preferences that were adopted. Due to their overwhelming abundance, the debate has been mainly focused on marine resources, whereas the comparatively less-represented macromammal assemblages have been poorly interpreted. However, it is precisely this scarcity that makes them so remarkable. Here, a new interpretation of the available data is presented, with a special focus on the identification of overhunting evidence and on the comparative productivity of each type of resource. Altogether, the demographic hypothesis seems to be more coherent with the existing facts.

1. Introduction

The Mesolithic witnessed a progressive increase in socio-economic complexity around the world towards the final appearance of agriculture. Not surprisingly, the diversity of environments, cultures and economies was so great (Spikins, 2007) that the establishment of a general shared pattern to define this period is unrealistic (Bailey, 2008). The reasons behind those changes are still being debated, with two main driving forces commonly invoked as triggering factors. On the one hand, the developmental theory argues that the intensification of resource procurement and the related territorial organization was intrinsic to human societies, caused either by demographic pressure pushing populations beyond the carrying capacity of the ecosystem (Cohen, 1977) or by the desire to increase social inter-relationships (Bender, 1979). On the other hand, the adaptationist theory claims that certain behaviours would be more productive and thus more suited within certain ecological conditions (Rowley-Conwy, 2004).

The Cantabrian Coast, located in the north of the Iberian Peninsula, has long been a focus area of such debate. At the beginning of the Holocene the region underwent dramatic changes in the economic, social and territorial organization of hunter–gatherers societies. Thus, there was a clear simplification of lithic technology (Fernández-Tresguerres, 1983; Clark, 1995), a near disappearance of artistic manifestations (Straus, 1992) and a reduction of mobility with an intensification of coastal occupation (Fano, 1996; González Morales, 1999; Straus and González Morales, 2003). In terms of economy, the Mesolithic diet broadened to include low-ranked prey, such as fast moving or dangerous animals, but in particular marine resources, the exploitation of which increased noticeably. In fact, the typical site of that period was the so-called “conchero” or shell midden. They were medium-sized caves located no more than 3 km from the present sea-shore containing great numbers of limpets and top shells, some animal bones, many quartzite picks and choppers and a limited number of small retouched tools (Vega del Sella, 1923).

Although the consumption of secondary resources had been increasing during the Upper Palaeolithic (Álvarez-Fernández, 2011), the Cantabrian Mesolithic showed for the first time a clear strategy of coastal exploitation, including marine molluscs, ocean fish, crabs and sea urchins (Gutierrez-Zugasti et al., 2011). This trend was accompanied by a significant decrease in the number of terrestrial mammal remains recovered from the available sites, in particular ungulates, which contrasts with the typical strategy of subsistence during the Upper Palaeolithic (Fano, 2004; González Morales et al.,

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2004; Marín-Arroyo and González-Morales, 2009). Adaptationists have interpreted these changes as the logical response adopted by hunter–gatherer groups facing a progressive reforestation and a rising sea level, which modified the availability of previously unwanted resources such as marine shellfish (Bailey, 1983; Arias, 1991; Craighead, 1995; Bailey and Craighead, 2003, 2004). However, other researchers have claimed that the intensification of marine resource exploitation was a direct consequence of human demographic growth (Clark and Lerner, 1980; Straus et al., 1980, Straus, 1986; Clark, 1987, 2004; Marín-Arroyo, 2009b). The abundant population would then need more resources as terrestrial mammals would not be sufficient to provide them with the required energy. Ungulates would then suffer some hunting stress (Straus, 1979; Estévez, 2005) and diet would widen to ensure food procurement from other sources (Marín-Arroyo and González-Morales, 2009).

Traditionally, intensification in the use of coastal environments during the Cantabrian Mesolithic has been investigated in terms of the evolution in shell size (Ortea, 1986; Straus and Clark, 1986; Bailey and Craighead, 2003; González Morales et al., 2004; Gutierrez-Zugasti, 2011) or the effect of sea level rise on the presence and visibility of sites (Bailey, 1978, 1983; González-Morales, 1982; Fano, 1996, 2004; Bailey and Craighead, 2004; Garcia Moreno, 2010). However, little attention has been paid to ungulate faunas, the low abundance of which has prevented an accurate economic interpretation. It is nonetheless the scarcity of ungulate remains which makes them so interesting for understanding the economic changes that took place during that period, particularly as ungulates made up the bulk of the diet during the Middle and Upper Palaeolithic.

Given this, a reappraisal of available faunal information, including from recent excavations, has been conducted as a complementary study to the numerous available malacological studies. A new zooarchaeological and taphonomic approach has been applied with a special focus on the possible identification of hunting pressure. The results reinforce the developmental theory, as a demographic crisis due to population growth would be more coherent with the available data.

2. Materials and methods

2.1. The Cantabrian Pleistocene/Holocene transition

The Cantabrian Coast (northern Spain) is a strip of land, approximately 350 km long and 30–50 km wide, located between the Atlantic Ocean to the north and the Cantabrian Mountains (with peaks of about 1500–2600 m above sea level) to the south. This short latitudinal distance is covered by fast-flowing rivers that run essentially perpendicular to the coast, carving a series of steep valleys that to some extent limit the communication routes through the region. Whilst in the eastern provinces of Asturias and Cantabria small coastal plains exist, in the western area of the Basque Country the mountain ridges often reach the coastline (Straus, 1992). The region benefits from the presence of warm waters brought by the North Atlantic Drift of the Gulf Stream, which leads to relatively mild climatic conditions for this northern latitude. As a result of these conditions, the area holds a rich archaeological record, above all during the Upper Palaeolithic, when it acted as a refugium for European animal and human populations during some periods (Consuegra et al., 2002; Achilli et al., 2004; Pereira et al., 2005; Pardiñas et al., 2012; Meiri et al., 2013).

The Pleistocene/Holocene transition produced notable changes in the life of the Cantabrian hunter–gatherer groups. Environmental changes such as sea level rise (Mary, 1992), the end of the cold period and subsequent extensive reforestation (García Moreno, 2007) affected the social and economic organisation of the human populations. Flora and fauna became adapted to more temperate climatic conditions (Harrison and Digerfeldt, 1993) whilst cold-adapted species disappeared (Altuna, 1992). The available zooarchaeological record for this period reveals a shift in hunting preferences, which now included some ungulates scarcely exploited before, such as wild boar and roe deer, in similar proportions to the previously dominating red deer and ibex. However, the most significant dietary transformation of that time was undoubtedly the intense and unprecedented exploitation of marine resources. Limpets, top shells and mussels started to be consumed

Table 1
MNI values of mollusc species in the Cantabrian Pleistocene/Holocene transition.

Site	Level	MNI marine mollusc
Late Magdalenian		
Oscura de Ania	IIIA	2
Las Caldas	III-0	3
Tito Bustillo	1A–1B	4451
Los Canes	2C/3	29
La Riera	21–26	713
La Pila	IV	296
Morin	2	9
El Pielago I–II	5	8
Rascaño	2B	5
La Garma A	N–O	4168
La Fragua	4	355
El Perro	2C/3	977
El Horno	3–1	23
El Miron	106–107	3
Goikolau	VI–V	187
Santimamiñe	ALMP + SLNC	3
Antoliña	LANC	10
Erralla	II	2
Laminak II	II	286
Azilian		
La Paloma	2	2
Oscura de Ania	1–2	6
Los Azules	3 ent	12
Los Canes	4	1
La Riera 27	27–28	8393
La Pila	III	6525
La Lastrilla	VII	534
La Fragua	3	328
El Perro	2A/B	14,227
Arenaza	III	1
Santimamiñe	ARCP	4
Laminak II	I	340
Abbitaga	V–VI	21
Anton Koba	VIII	2
Ekain	V–II	311
Mesolithic		
Mazaculos	1–3/A3	8322
La Llana	1	6704
El Penincial	–	1621
Balmori	E1–C1	3208
Coberizas	B1	3070
La Riera	29-30-B	4272
Arnero	A	255
Bricia	A	1529
Fonfria	–	20
Vidiago	–	124
Lledias	B	502
Los Canes	6–10	627
Pozal'egua	2–1	1601
La Pila	I–II	8827
Cofresnedo	V0	4
El Perro	1	15,242
La Fragua	1	11,900
La Chora	mustr.92	159
La Trecha	–	1505
Kobeaga II	AMCK-AMK	2882
Santimamiñe	H-SLN	36
Marizulo	IV–III	246