USE OF THE LANDSCAPE BY HUMANS FROM THE MIDDLE PALAEOLITHIC TO THE NEOLITHIC.
THE CASE OF THE NORTHERN SHORE OF THE STRAIT OF GIBRALTAR

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Resumen

Este trabajo resume la evidencia recogida en la última década en las cuevas kársticas del Peñón y presenta un interpretación de las estrategias de subsistencia y uso del paisaje de las comunidades que ocuparon la orilla norte del el estrecho de Gibraltar entre 100 y 6 mil años ap. Se expone la tesis que las diferencias entre el Paleolítico Medio y Superior y el Neolítico son de grado y no son cualitativamente distintas. La proximidad de El Estrecho de Gibraltar, con su riqueza de recursos marinos, significó que incluso los Neandertales explotaran estos. En el momento de la revolución del Neolítico las comunidades costeras mantuvieron las tradiciones de pesca y fueron los del interior los que cambiaron de cazadores-recolectores a estrategias de producción.

Abstract

This paper summaries the evidence that has been collected in the past decade from the limestone caves arround Gibraltar and presents an interpretation of the subsistence strategies and landscpae use of the communities of people that inhabited the northern shore of the Strait of Gibraltar between 100 thousand and 6 thousand years ago. The thesis is put forward that the differences between the Middle and Upper Palaeolithic and the Neolithic are of degree and are not qualitatively distinct. The proximity of the Strait of Gibraltar, with its rich marine resources, meant that even Neanderthal people exploited marine resources. At the time of the Neolithic revolution the coastal communities countinued the fishing traditions and it was those inland that moved from hunter-gatherrer to production strategies.

Introduction

In a recent paper Finlayson *et al.* (2000) have put forward the thesis that there was very little difference in the cognitive capacities of humans of the Late Pleistocene and that comparable behaviours between modern and archaic humans may be found as far back as 250 thousand years ago (kyr). The essential differences between human ecotypes (and even within ecotypes) were related to differences in patterns of landscape use and resource exploitation that were related to changing environmental conditions as climate changed. Finlayson *et al.* (1999) have presented a preliminary model of resource exploitation patterns in the Strait of Gibraltar from the Middle Palaeolithic to the Neolithic. In this paper we show how the evidence currently available from the rich archaeological and palaeontological deposits in the region of the Strait of Gibraltar can be used in support of the thesis that human landscape use and exploitation patterns had more to do with changing climate-driven environmental conditions than with the taxonomic position of the humans themselves. We recognise, however, that there is a cumulative historical process that permits the building of cultural adaptations through time. This is, in our view, a pattern that superimposes itself on the ecological backdrop. It is achieved, for example, through improved exploitation patterns. Such developments permit prolonged persistence and reduce extinction risk during periods of resource impoverishment or scarcity but, ultimately, the nature of the human responses to the landscape should be quantitative not qualitative. Thus it is difficult to attribute a particular moment to an Upper Palaeolithic Revolution although it is clearer in the case of the Neolithic. In the case of the Strait of Gibraltar, the availability of diverse natural resources in effect prolonged Palaeolithic-type subsistence strategies into the Neolithic (Finlayson *et al.*, 1999).

The Climatic Régime and Human Groups

The climatic regime that affected the planet during the last 65 kyr was an unstable one as illustrated by the Greenland Ice Core record (GRIP, 1993). The period corresponds to Oxygen Isotope Stages 3-1. Neanderthals occupied the area of the Strait of Gibraltar for the early part of the period between 65 and 31 kyr (Barton *et al.*, 1999; Pettitt & Bailey, 2000). The precise dating of the arrival of modern humans is undetermined although their presence is confirmed in Gorham's Cave at 29 kyr (Pettitt & Bailey, 2000). Finlayson (2000) & Finlayson *et al.* (2000) have suggested, using available data, that modern humans arrived in the area once the Neanderthals had become extinct in which case there would have been a period (of anything up to 2 kyr) when the area of the Strait was depopulated. Evidence of early modern occupation is thin and it is highly questionable whether the earlier modern technologies (proto- and early Aurignacian) are at all represented in the southern Iberian Peninsula. There is a small number of sites in the Gravettian but it is the Solutrean that is most conspicuous in its ubiquity. The Tardiglacial is represented by the Magdalenian which is conspicuous by the marked decrease of sites in the area. These population pulses have been attributed by Finlayson *et al.* (in prep.) to climate changes across Europe. Thus there is little difference in the population distribution between the Aurignacian and the Gravettian in western Europe (Bocquet-Appel & Demars, 2000) in spite of the cooling during the Gravettian. It is during the onset of the Last Glacial Maximum (LGM) that the human population of the west European peninsula is in severe decline and this coincides with the Solutrean increase in Iberia, suggesting that it acted as a major glacial refugium (Torroni *et al.*, 1998). The Magdalenian decrease can be correlated to a major re-population of Europe after the LGM and it is quite likely that human populations, adapted to cold steppe environments, then experienced habitat fragmentation in the south. The onset of interglacial conditions in the Holocene saw a new population expansion and a spread into new habitats, a process that probably commenced at the end of the Magdalenian. Although this period is characterised by the spread of agriculture and farming, the coastal communities of the Strait of Gibraltar continued to behave as hunter-gatherers with a strong bias towards fishing and collection of marine resources (Finlayson *et al.*, 1999).

Neanderthal Resource Exploitation Patterns and Landscape Use

During the cool but variable OIS 3 Stage, between 60 and 25 ka (van Andel & Tzedakis, 1998), the sea level oscillated between -70 and -85 m. In Gibraltar, the coastline, on the eastern side was significantly extended. Extrapolating current bathymetric charts we have estimated that the surface area of land available outside Gorham's and Vanguard Caves would have been of the order of 35 km^2 (Finlayson & Giles Pacheco, 2000) and the coastline to the east may have been between 2.5 and 4.5 km from the caves. The main characteristic of this land area was its sandy nature. Two other major topographical features were: (a) a shallow river estuary opening into the Mediterranean Sea north-east of the Rock; and (b) a deep and narrow bay in the west into which the palaeo-Palmones and Guadarranque rivers would have opened.

According to Finlayson & Giles Pacheco (2000) the conditions on the sandy plain outside Gorham's and Vanguard Caves were similar to those of a wooded savanna (e.g. Morel, 1968). There was a high expected probability of grass cover that would have supported a rich herbivore community (Owen-Smith, 1988; Sinclair, 1995). The expected patchy distribution of shrub and tree cover would have further enhanced herbivore diversity (Guthrie, 1984). The structural tree characteristics (height, cover, trunk circumference and density) were consistent with an open landscape in which herbivores could be easily detected by predators. Such a landscape would have supported a rich carnivore community (and associated scavengers) (Hanby & Bygott, 1979; Sunquist & Sunquist, 1989; Dayan & Simberloff, 1996).

The dominant tree species predicted by Finlayson & Giles Pacheco's (2000) model was the Stone Pine *Pinus pinea.* Of particular interest was the presence of Juniper *Juniperus phoenicea* which would be expected to be patchily distributed across the landscape. The generic composition of shrubs was dominated by Mediterranean-type (Rivas-Martinez, 1987) woody species. The predicted plant species distribution was closely matched by the results of anthracological analyses.

The mammalian herbivore community of this sandy plain during the stratigraphic sequence covering OIS 3 appeared constant in terms of species composition in spite of the climatic fluctuations of this stage (Bond *et al.,* 1993; Dansgaard *et al.,* 1993; McManus *et al.* 1994). The permanent components were Red Deer *Cervus elaphus*, Cattle *Bos* cf *primigenius* and Rabbit *Oryctolagus cuniculus* (Currant, 2000). Other herbivores/omnivores included the Rhinoceros *Stephanorhinus* cf *hemitoechus*; Horse *Equus caballus*; and Wild Boar *Sus scrofa.* (Currant, 2000). The prediction of a diverse herbivore community, albeit of reduced species composition when compared to earlier in the Pleistocene, in the sandy plain outside Gorham's and Vanguard Caves was supported by the evidence.

The mammalian carnivore community for the same sequence was also diverse (Currant, 2000). The most uniformly spread species across the stratigraphy were Spotted Hyaena *Crocuta crocuta*, Lynx *Lynx pardinus,* and Leopard *Panthera pardus*. Also present in several levels were Wolf *Canis lupus*, Brown Bear *Ursus arctos* and Wild Cat *Felis sylvestris.* A large felid (tentatively ascribed to a Lion *Panthera* cf *leo*) has also been described. The mammalian carnivore community therefore fitted well in the predicted scenario of the model.

Three of the four contemporary European vultures have been described from the Gibraltar OIS 3 sites: Griffon Vulture *Gyps fulvus* in Gorham's Cave (Eastham, 1967; Cooper *pers.comm.*); Bearded Vulture *Gypaetus barbatus* in Ibex Cave in a level ESR-dated between 37.1 ± 3.3 Ka BP (Early Uptake) and 49.4 ± 3.2 Ka BP (Late Uptake), (Cooper, 2000); and Egyptian Vulture *Neophron* cf *percnopterus* from Vanguard Cave (Cooper, *pers. comm.*). To these we can add the following bird species which regularly scavenge on carcasses: Red Kite *Milvus milvus* and/or Kite sp. *Milvus* cf *milvus* (Eastham, 1967; Cooper *pers. comm.*); Raven *Corvus corax* (Eastham, 1967); Carrion Crow *Corvus corone* (Eastham, 1967; Cooper, 2000); and Jackdaw *Corvus monedula* (Eastham, 1967)

Additional supporting evidence for the environment predicted by the model comes from the presence of Hermann's Tortoise *Testudo hermanni* in Gorham's and Vanguard Cave levels (Currant, *pers.comm.*) and from several species of bird which are characteristic of open woodland or plains environments in southern Europe today: Lesser Kestrel *Falco naumanni* (Cooper, 2000); Turtle Dove *Sterptopelia turtur* (Cooper, *pers. comm.*); Roller *Coracias garrulus* (Cooper, *pers.comm.*) and, possibly corresponding to this sequence from Gorham's Cave, Great Bustard *Otis tarda* and Hoopoe *Upupa epops* (Cooper, *pers.comm.*).

The presence of Wild Olive (*Olea europaea*) and Lentisc (*Pistacia lentiscus*) can be attributed to the environment of the Rock itself (Finlayson & Giles Pacheco, 2000). These species are key indicators of the thermo-Mediterranean bioclimatic stage (Rivas-Martinez, 1981; 1987) and would have been major components of a dense woodland or matorral such as is found on the Rock today. Among the mammalian herbivores found in Gorham's, Vanguard and Ibex Caves the Spanish Ibex *Capra pyrenaica* is one of the most numerous (Currant *pers.comm.*). This species would have occurred on the rocky peninsula, especially on the cliffs and taluses of the northern and eastern sides along which these caves, and also Forbes' Quarry and Devil's Tower, are situated. Some of the mammals of the plains would have been found in these environments also and would have included Red Deer, Wild Boar and Rabbit. The carnivores would have included Brown Bear, Wild Cat and Lynx. There is considerable evidence for cliff-dwelling bird communities. Finlayson (1992) has reviewed the cliff-dwelling breeding avifauna of Holocene southern Iberia. The OIS 3 cliff avifauna appeared identical to that of the Holocene (Finlayson & Giles Pacheco, 2000). A number of the scavengers which we have recorded for the sandy plain, i.e. the vultures, the Raven and the Jackdaw, would have nested on these nearby cliffs. Finally, we include here the significant presence of a partridge species (*Alectoris* cf *rufa*) in the three caves (Eastham, 1967; Cooper, 2000 and *pers.comm.*). This sedentary species occurs in a broad range of vegetated environments in southern Iberia today and would be expected on rocky peninsula and the sandy plain.

The available data indicates the presence of a shallow estuary to the north-east of the Rock (Finlayson & Giles Pacheco, 2000). Shallow estuarine conditions, usually with associated lagoons and dense aquatic vegetation, are particularly favourable for waterbirds (Finlayson, 1992) and would have attracted most of the mammals from the adjacent sandy plain just as similar conditions do in the Coto Doñana (132-km NW of Gibraltar) today. The presence of a large range of waterbirds in Gorham's, Vanguard and Devil's Tower caves (Eastham, 1967; Cooper, 2000 and *pers.comm.*) corresponds, in our opinion, to the existence of this wetland.

The coast is the final element in the range of landscapes available around the Rock. The evidence from Gorham's and Vanguard Caves indicates the presence of the Monk Seal *Monachus monachus* (Currant, *pers.comm.*) during OIS 3. This species is characteristic of the Mediterranean today where its numbers have been reduced almost to extinction in historical times. Coastal areas would have provided additional resources to Neanderthals, specifically molluscs (Barton *et al.*, 1999).

The southernmost European Neanderthals were therefore dwellers of open, probably highly seasonal, savanna-type and wetland environments, combining a large mammal fauna in structurally accessible conditions with a range of alternative potential resources (fruit, seeds, smaller animals and lithic raw materials). They were widely dispersed and probably followed regular seasonal activity cycles related to changing mammalian herbivore biomass. Such activities may have included, for example, the exploitation of herbivore concentrations in water holes during the dry season. The Neanderthal world was probably perceived as fairly constant at the human generation timescale with a very specific range of available prey types. Such environmental constancy, changing only in terms of prey numbers in relation to inter-annual climate fluctuations but not in terms of component species, must have made the Neanderthals seasonal resource specialists capable of hunting large mammals, wildfowl, tortoises, and harvesting plant and marine resources. The evidence from Gorham's and Vanguard Caves supports this view (Barton *et al.*, 1999). Furthermore, the southerly latitudes of these Neanderthals would have permitted a

fairly constant year-round activity in response to a relatively uniform daylength pattern, contrasting with the more-sharply defined daylength régimes further north.

Modern Human Resource Exploitation Patterns and Landscape Use in the Palaeolithic

The situation described is likely to have remained unchanged for much of the OIS 3 stage. Towards its end, and coinciding with the onset of colder conditions leading to the last glacial maximum during OIS 2, the environmental conditions in southern Iberia appear to have changed rapidly and dramatically (Finlayson & Giles Pacheco, 2000). The bioclimatic belts responded quickly, given their relative spatial proximity along altitudinal gradients, and the open wooded savanna of Gibraltar appears to have been replaced by a denser and less-productive forest of the montane pines (*P.nigra/sylvestris*) characteristic of meso- and supra-Mediterranean stages. At the same time, Mediterranean vegetation practically disappeared from the higher ground which was transformed into an arid steppe (Carrión, 1992; Vega-Toscano & Carrión, 1993). Such dramatic changes significantly altered the resource world of the Neanderthals, only to be partly substituted by the arrival of marine species from the north, e.g. Atlantic Grey Seal *Halichoerus gryphus* and a range of North Atlantic wildfowl, (Finlayson *et al.*, in prep.) and may have stressed these last populations beyond recovery. These environments were so unproductive that it seems likely that large tracts of the southern Iberian landscape were unoccupied by any kind of human between 30 and 22 kyr. It was with the further expansion of the steppe environments from inland regions towards the LGM that we observe the Solutrean demographic explosion.

Modern Human Resource Exploitation Patterns and Landscape Use in the Neolithic

The first anthracological results from the Neolithic level at Gorham's Cave (Finlayson *et al.*, 1999) indicate clearly the thermo-Mediterranean (Rivas-Martinez, 1987) of the vegetation. Three types of vegetation are identifiable:

(a) a group composed of species that are typical of limestone. The main species are *Pistacia lentiscus* (18.8%), *Olea europaea* (12.2%), *Quercus ilex/coccifera* (1.7%), *Pistacia* cf. *terebinthus* (1.1%) and *Ceratonia siliqua* (0.6%);

(b) a group of species typical of sandy soils, in particular pines (*Pinus* sp.) that include *P.pinea* and *P.halepensis* (18.3%), *Juniperus* sp. (7.2%), and *Erica* sp. (1.1%); and

(c) a group characterised by riverine species, such as *Fraxinus* sp. (1.1%), *Alnus* sp. (0.6%), *Populus* sp. (0.6%) and *Salix* sp. (0.6%).

A preliminary analysis of the bone remains indicates a predominance of rabbits *Oryctolagus cuniculus* and a large number of birds among which typical cliff species, such as the Rock Dove *Columba livia* (Finlayson, 1992), and partridges are dominant. There are also large numbers of marine molluscs in particular *Patella* sp. Among the large mammals the main species are Red Deer *Cervus elaphus* and Ibex *Capra pyrenaica* among which there is a high proportion of juveniles. There is no evidence of domestic goat. Among other herbivores there is a single specimen of *Bos* sp. And another of *Sus* sp. Of interest is the presence of a seal (in all probability Monk Seal *Monachus monachus*). The carnivores identified are Wolf *Canis lupus*, Wild Cat *Felis silvestris* and Fox *Vulpes vulpes*.

The Neolithic of Gibraltar is therefore part of a process, with its beginnings in the Middle Palaeolithic, which is based on a human response to changes in the physical and biotic environment that are related to climate change (Finlayson *et al.*, 1999). In warm periods the Neanderthals that occupied these sites exploited a great range of resources and occupied small

home ranges as we have described. Cold events caused significant vegetation and faunal changes and the downward movement of montane vegetation. The climatic recovery towards OIS 1 recovered the tactics used in OIS 3 but this time by modern humans. Nevertheless the sea level rise removed the great sand dune system and caused a reduction in the surface area available to pines and for large groups of mammalian herbivores. The large mammal resource was thus reduced to Red Deer and Ibexes that could have lived on the Rock itself. The use of marine resources (including seals and tuna) took on fresh impetus as happens in other Mediterranean sites (Ripoll & Raga, 1998). The terrestrial environments are then restricted to cliffs and slopes on the Rock where a Mediterranean woodland and matorral with a thermo-Mediterranean character develops with species such as olives and lentiscs that were already present in OIS 3. In the Neolithic there is a clear increase in the diversity of plants collected by humans which we attribute to a resource base shift as the mammals of the plains disappeared. We conclude that the Neolithic inhabitants were hunter-gatherers and fishermen with little evidence of domestication of animals or agriculture.

Conclusions

The patterns of landscape use and resource exploitation in the northern shore of the Strait of Gibraltar reflect changing landscapes in relation to climate change. The differences are of degree and there is no qualitative difference between the Middle and Upper Palaeolithic nor with the Neolithic. The main proximate factors affecting resource use and dispersion of humans are the (a) degree of open steppic environments, and (b) the amount of land area exposed on the continental shelf and its corresponding vegetation and fauna.

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