

# The shell midden of Pico Ramos and the exploitation of molluscs in the Cantabrian region (northern Spain)

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## Abstract

Human groups exploited molluscs during the Mesolithic-Neolithic transition (MNT) at Pico Ramos. Results show that the most exploited species were limpets and topshells collected in rocky open shores, while other species were collected in estuaries. Therefore, different environments were exploited by human groups. This pattern is related to the location of the cave in the mouth of the estuary. The exploitation pattern suggests that collection was carried out in several short visits to the cave. The characteristics of the accumulation also fit the pattern of intensification identified in the region, which show that molluscs were important for human groups during the Mesolithic and the early Neolithic. However, it is difficult to establish if Pico Ramos was used by hunter-gatherers resisting the introduction of agriculture and domestication, or if on the contrary it was a specialized site used by food producers for hunting-fishing-gathering activities.

**Keywords:** shell midden; archaeomalacology, Mesolithic Neolithic transition, hunter-fisher-gatherers, Cantabrian region.

## 1. Introduction

The exploitation of shellfish was a common activity among hunter-fisher-gatherers since at least the early Upper Palaeolithic in the Cantabrian region (Álvarez-Fernández, 2011; Gutiérrez-Zugasti, 2011a). However, higher intensity in the use of shellfish and other marine resources seems to have occurred during the Mesolithic and the Neolithic according to the regional record (Gutiérrez-Zugasti, 2009, 2011a).

The Mesolithic-Neolithic transition (MNT) is poorly known in northern Spain. The shell midden of Pico Ramos has been dated to a rather long period of the MNT (5900-4050 cal BC) based on radiocarbon dates (Zapata, this volume). However, no evidence of domestication and agriculture has been found in Level 4 at Pico Ramos (apart from two cereal grains, dated to the latest occupation of the level (4330-4050 cal BC) –see Zapata *et al.*, 2007) showing that the site was mostly used for hunting, fishing and gathering activities. Other coastal sites dated to the early Neolithic in the region show mixed subsistence strategies, including wild resources, but also domestication and agriculture, as for example Kobaederra (Zapata *et al.*, 1997) and Los Gitanos (Ontañón, 2005). Therefore, during the transition to the Neolithic different realities can be found in the region, showing that hunter-fisher-gatherer lifeway

coexisted with the first evidence of neolithization. This has given rise to a complex situation regarding the interpretation of these sites. Thus, sites with only wild resources have been interpreted in two ways: 1) as sites occupied by groups with a Mesolithic way of life, which have not adopted farming; 2) or as Neolithic specialized sites, where groups of farmers developed activities related to hunting, fishing and gathering (see Zapata, 2007 for a summary on this issue).

One of the gathering activities that remain important during the transition period is the exploitation of molluscs. The exploitation of the shells in Pico Ramos in particular has been dated through the direct radiocarbon dating of oysters (4710-4330 cal BC, reservoir effect corrected) and wood charcoal associated with their processing or cooking (4910-4540 cal BC). These two dates overlap c. 4700-4500 cal BC and are considered likely dates for the marine mollusc exploitation at the site (notwithstanding that the exploitation could have also taken place before and afterwards) (Zapata, this volume).

In this paper, I put the archaeomalacological assemblage from Pico Ramos in a wider context. First, I explain the assemblage in terms of main exploited species and collection areas. Then I address the exploitation of shellfish during the MNT and the early Neolithic in the Cantabrian region.

### The use of molluscs at Pico Ramos

The archaeomalacological assemblage from Pico Ramos comprises a number of marine molluscs, but also crustaceans and equinoderms (see Moreno, this volume). The most important species are limpets (~57% MNI), topshells (~23%), mussels (~7%), oysters (6%) and clams (6%), while the remaining taxa represent only negligible numbers. This pattern is very similar to that of other Mesolithic and Neolithic sites in the Cantabrian region where limpets and topshells are the most predominant species (Gutiérrez-Zugasti, 2009).

The main taphonomic processes affecting the shells are fragmentation and burning (Moreno, this volume). The fragmentation pattern reflects the different strength of every shell, it is probably related to human activities and it is comparable to that of other sites of the same chronology and characteristics (Gutiérrez-Zugasti, 2011b). On the other hand, burning is probably related with the preparation of the molluscs for consumption or with the disposal of the shells close to fireplaces. Sometimes the fragmentation might also be related to the preparation method. This is the case of spiralled gastropods such as *Phorcus lineatus*, whose soft parts can be removed by breaking the apex. This method is used by current hunter-gatherers (Wasekov, 1987) and it has been proposed to be used in prehistoric societies (Colonese *et al.*, in press; Compagnoni, 1991; Mannino *et al.*, 2012). However, at Pico Ramos, 40% of *Phorcus lineatus* are intact, suggesting that this method was not used or it was used only in part of the shells. Opening bivalves can also produce fragmentation of the shells if they are open using some tool, although roasting or boiling have been demonstrated to be very efficient methods (Wasekov, 1987). Limpets, given their characteristic morphology, could have been cooked or eaten raw. In this case, fragmentation could have been caused by using tools when collecting (Clemente *et al.*, in press; Paillet *et al.*, 2007).

The exploitation pattern shows that both open coast and estuarine species were exploited. Sea level rise for the last 10,000 years has been recently studied in the region (Leorri *et al.*, 2012; Cearreta and Leorri, this volume). Thus, during the MNT the coastline would have been around -5 m. below mean sea level which means that the distance from Pico Ramos to the coastline was ~2 km at the time of the shell midden formation. This situation enabled the exploitation of the productive nearby coastal areas, such as the beach of La Arena and the estuary of the Barbadun river. At least the limpet species *Patella ulyssiponensis* and probably *Patella depressa*, as well as the topshells *Phorcus lineatus* were collected in rocky areas at the beach, while the clams (*Ruditapes decussatus*, *Ruditapes/Venerupis*, Veneridae family) and the razor shells (*Solen marginatus*, Solenidae family) were collected in areas of soft bottoms (sand/mud). The clams usually live in estuaries, but razor shells can live in both estuary or in more open beaches. Other species,

such as the limpet *Patella vulgata* and oysters (*Ostrea edulis*) and mussels (*Mytilus galloprovincialis*) were collected in rocky areas. However, they are more ubiquitous in terms of habitat so could have been collected either in the open beach or in estuary contexts. Some species, such as *Melaraphe neritoides*, *Bittium* sp. and *Hydrobia* sp. (the appearance of the latter genus among the land snails has been reported by Ken Thomas, this volume) are very small to have been consumed and were likely not collected intentionally. These species may have reached the site accidentally as part of the collection of other species.

Level 4 at Pico Ramos has been interpreted as a palimpsest of occupations at different times from the late Mesolithic to the early Neolithic. Based on the MNI, shellfish gathering suggests that visits to the cave were very short. For example, modern experiments have stated that 300 limpets can be collected by one person in one hour (Gutiérrez-Zugasti, 2009), although these numbers are dependent on the resource availability and the technology used. Following these figures, limpets from Pico Ramos would have been collected in less than five hours. Topshells are even easier to gather since tools are not needed for their collection. Other shells, such as oysters and mussels, can be collected in bunches. Since these species attach to rocks by their byssus, they could have been removed using tools. Finally, soft bottom shells, such as clams and razor shells, are collected by digging into the sand/mud. In summary, based on MNI, it seems that the Pico Ramos assemblage was collected in just a few days. Based on available data, it is difficult to determine if different species and environments were targeted at the same time or during different visits. Data on seasonality of oysters show that collection was carried out from late winter to summer, showing a very seasonal pattern. However, spatial analysis has shown differences in seasonal gathering between areas of the cave, suggesting that oysters were collected in several episodes (Milner, this volume; Zapata *et al.*, 2007). The same pattern of several small collections could have been followed for the rest of the species.

### Shellfish gathering during the Mesolithic-Neolithic transition in the Cantabrian region

The shell assemblage at Pico Ramos presents a similar composition to that of other late Mesolithic and early Neolithic sites in the Cantabria region. Molluscs are the main component of the shellfish assemblages in the region, while crustaceans and echinoderms are usually present in much smaller numbers. The composition of the shell middens is related to the location of the sites (Fig. 1). Thus, sites located in the mouth of estuaries and very close to fully marine locations (e.g open beaches) are mainly composed by rocky molluscs, such as limpets (*Patella vulgata*, *Patella depressa*, *Patella ulyssiponensis*) and topshells (*Phorcus lineatus*). However, they also show lower numbers of estuarine species. This is the case for Pico Ramos, as well as other shell midden sites such

as Arenillas, La Trecha, Mazaculos II (Gutiérrez-Zugasti, 2009), La Lloseta and San Antonio (Clark, 1976).

Other sites are located in the range 0-5 km to the coastline, but further away from the estuarine influence, as Los Gitanos (Álvarez-Fernández, 2011), Les Pedroses (Clark, 1976), Herriko Barra (Iriarte *et al.*, 2005), Lumentxa (Barandiarán, 1965, 1966) and Atxurra (Barandiarán, 1961). These sites (except Herriko Barra, whose molluscs assemblage has not been published) show exploitation of rocky species from exposed locations, dominated by limpets and topshells, but with almost total absence of soft bottom species. Finally, there are molluscs in sites located to more than 5 km from the coastline, such as Marizulo (~7-8 km) (Altuna, 1972; Laborde *et al.*, 1966) and El Tarrerón (~25 km) (Apellániz, 1975), with predominance of rocky shores species, but with some soft bottom species.

On the other hand, assemblages from sites located in the interior of the estuaries, such as Kobaederra, Santimamiñe and Atxeta, consist primarily of rocky species, such as oysters (*Ostrea edulis*) and soft bottom species, such as clams (*Scrobicularia plana* and *Ruditapes decussatus*) (Gutiérrez-Zugasti, 2009). Nevertheless, these sites also contain smaller numbers of species from fully marine locations, showing some mobility to more exposed environments. During the Mesolithic, an increase in the use of estuaries can be noted compared to previous periods. However, it is during the late Mesolithic and the Neolithic when shell middens were mainly formed by estuarine species. This is probably related to the stabilization of the sea level and the formation of the current estuaries around 7000 cal BP (Leorri *et al.*, 2012) which enabled the exploitation of these very productive environments. Our knowledge of

the Upper Palaeolithic estuaries is very limited, but if they existed, they were probably quite different to the current ones, and less profitable in terms of productivity (Gutiérrez-Zugasti and Cuenca, in press).

A higher number of species has been recorded in Mesolithic and Neolithic sites. This is also related to the formation of the estuaries and the availability of species living on this environment. Thus, in sites located close to estuaries and open beaches the number of species to account for the 80% of the shell midden is usually higher than in sites located near only exposed areas, as can be noted at El Perro, La Trecha and La Chora during the Mesolithic and at Arenillas, Pico Ramos and Kobaederra during the MNT and early Neolithic. However, evidence of shell middens dominated by estuarine species only appear during the Neolithic, as in Kobaederra and Santimamiñe, which suggest that these environments were important for human populations during the latter period (Gutiérrez-Zugasti, 2009).

Data on seasonality of mollusc exploitation during the MNT and the early Neolithic is very limited in the region. The only information is coming from the analysis of growth lines of oysters (*Ostrea edulis*) at Pico Ramos (Milner, this volume; Zapata *et al.*, 2007) and Kobaederra (Gutiérrez-Zugasti, 2009). Both studies show similar results, with collection from winter to summer, but with the most of the collection in spring months. Therefore, it seems that the exploitation of oysters had a strong seasonal component during this period in the region. Further research on the seasonality of limpets and topshells should be carried out in order to determine if these species were collected in the same seasons as oysters or if they followed a different pattern.



**Figure 1.** Location of Mesolithic-Neolithic transition sites cited in the text.

Finally, evidence of intensification in the exploitation of molluscs during the Mesolithic and Neolithic has been found in the region based on (1) the presence of larger amounts of shells in the sites, (2) broadening of the number of species collected, (3) decrease in the size and age of the shells over time, (4) collection in lower and exposed intertidal areas as well as in areas of soft bottoms, and (5) the use of technology in the gathering process (Gutiérrez-Zugasti, 2009, 2011a). Some of these characteristics have been found at Pico Ramos, such as the high number of species collected, gathering in different environments and a possible decrease in the size of the oysters over time (Milner, this volume).

## Conclusions

Shell collection at Pico Ramos was carried out in areas located within a radius of ~2 km from the site, such as La Arena beach and the estuary of the Barbadun river. Exploitation included a variety of species, both from rocky areas and soft bottoms, although species from the former area were the most exploited (mainly limpets and topshells). Shells were probably collected in a few seasonal episodes focused between the winter and summer months.

Pico Ramos fits the pattern found in other sites of similar location and chronology and it is an example of the use of molluscs by human populations during the MNT. With the available data, it is difficult to establish if Pico Ramos was used by “pure” hunter-gatherers resisting the adoption of agriculture and domestication, or if on the contrary it was a specialized site used for hunting-fishing-gathering by Neolithic groups. However, the evidence of intensification suggests that molluscs were still playing an important role in the subsistence strategies of Mesolithic and Neolithic coastal societies.

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