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## Time for the tide. New perspectives on hunter–fisher–gatherer exploitation of intertidal resources in Atlantic Europe and Mediterranean regions



### 1. Introduction

In the last decades, archaeological studies have highlighted the importance of coastal areas for understanding human–environment interaction in past societies (Erlandson, 2001; Bar-Yosef Mayer, 2005; Bailey et al., 2013; Szabó et al., 2014 and references therein). Coastal regions of Atlantic Europe and the Mediterranean have traditionally been favoured areas of study as they provide some of the world's longest records of coastal resource exploitation by hunter–fisher–gatherer societies (Milner et al., 2007; Colonese et al., 2011; Gutiérrez-Zugasti et al., 2011). Understanding the various roles played by intertidal resources in different regions is key to increasing our knowledge of the diachronic and geographic patterns associated with the exploitation of coastal resources by such societies, as well as the past environment and biology of marine organisms. Thus, using different methodologies, intertidal resources (molluscs, crustaceans, echinoderms, etc.) can provide a wide range of information on past subsistence strategies, settlement patterns, symbolic activities, and palaeoenvironmental conditions (Claassen, 1998; Bailey et al., 2013).

The papers published in this special issue of Quaternary International were presented in session B83 “Time for the tide. New perspectives on hunter–fisher–gatherer exploitation of intertidal resources in Atlantic Europe and Mediterranean regions” of the XVII congress of the International Union of Prehistoric and Protohistoric Sciences (UISPP) that took place in Burgos (Spain) in September 2014. The session brought together a wide variety of scholars addressing the role of intertidal resources in Atlantic Europe and Mediterranean regions from the Middle Palaeolithic to the Mesolithic. It provided a stimulating forum for discussion of new theoretical and methodological approaches to understanding human uses of coastal resources within distinct cultural, climatic and environmental contexts.

This special issue presents a new generation of studies from research projects conducted on key sites. Methodologically, it encompasses the application of zooarchaeological analysis of molluscs, sea urchins and fish bone assemblages, as well as more recent advances in tool and ornamental shell technology, radio-carbon Bayesian modelling, and stable isotope analyses for determining seasonal patterns of shellfish harvesting.

### 2. The focus of this special issue and summary of the papers

#### 2.1. Middle Palaeolithic

Starting with the Middle Palaeolithic, three works published in this special issue relate to the use of marine molluscs as food resources and raw materials for tool production.

Ramos et al. (2016) report stratigraphic and faunal evidence of exploitation of rocky shore marine molluscs, mainly Patellidae, associated to archaeological contexts dated between 254 and 70 ka BP from the Benzú rockshelter in Ceuta (North Africa). The taxonomic and quantitative data presented by the authors suggest a low level exploitation which dates to 254 ka in the Middle Pleistocene, pushing back the date of what was previously the earliest evidence in Mediterranean Europe, documented at Bajondillo cave (Cortés-Sánchez et al., 2011), by almost 100 ka. Such an early occurrence has significant implications for understanding the use of intertidal resources and its archaeological visibility amongst early humans in northern Africa. However, the scale of such exploitation is difficult to evaluate in this case considering the limited surface of the excavated area and the brecciated nature of the archaeological deposits.

Similarly focusing on limpets (*Patella* sp.) in the Gibraltar Strait area, the paper authored by Fa et al. (2016) reports evidence of marine mollusc exploitation from Gorham's Cave (Gibraltar) between the Late Middle Palaeolithic (level IV) and Upper Paleolithic (level III). The authors present quantitative and biometric data from recently excavated (1998–2005) deposits allowing for a better evaluation of coastal resource exploitation patterns examined in previous works (Fa, 2008; Stringer et al., 2008). As discussed by the authors, due to the narrow and stepped continental shelf around the site location, Gorham's cave has never been more than 2 km away from the coastline, thus providing easy access to littoral resources within a short foraging radius.

The paper by Romagnoli et al. (2016) on the Middle Palaeolithic assemblages of Grotta del Cavallo (Italy), dated to the MIS 5, present an evaluation of the use of *Callista chione* shells as a raw material. The authors frame the sequence of technological gestures, or *chaîne opératoire*, within debates on the variability of middle Palaeolithic assemblages (especially the Quina concept) by confronting the description of archaeological materials with qualitative observations derived from a reduced set of shell knapping experiments.

#### 2.2. Upper Palaeolithic

Regarding the Upper Palaeolithic, three papers have been published in this special issue addressing questions related to the use of marine molluscs as a food resource, raw materials for ornamental shell production, and as indicators of seasonal foraging patterns.

The paper by Perlès (2016) on Franchthi Cave (Greece) reveals significant changes in the use of littoral resources along the Upper Palaeolithic and Mesolithic sequences. During the early Upper

Palaeolithic, fishing activities are not evidenced at the site and shells appear to be exclusively exploited for ornamental purposes. In contrast, during the late Upper Paleolithic (Epigravettian; Phase 5) and the Upper Mesolithic (Phase 8), fish remains are well represented at the site, even at higher NISP/volume than marine mollusc species. Interestingly, during Phases 6 (also Epigravettian) and 7 (Lower Mesolithic), there is a marked decline in the fish remains whereas shellfish attain very modest values. During the Final Mesolithic (Phase 9), both fish and shellfish remains reach their maximum quantitative representation in the archaeological sequence, with the author observing a significant increase in both.

As pointed out by Perlès, the diachronic changes inferred in shellfish procurement and fishing activities at Franchthi are not correlated to sea level variations, nor to the distance from the cave to the sea. Furthermore, the trends observed in the use of coastal resources along the different phases do not follow a linear pattern of increasing intensification, but rather a fluctuating one. Factors such as site function, occupational intensity and duration within each phase, and cultural preferences seem to have played a major role in the final configuration of the mollusc and fish bone assemblages.

The paper by Jordá et al. (2016) focuses on the diachronic analysis of marine bivalve assemblages from the Gravettian to the Early Neolithic using data from Nerja cave (southern Iberia). During the earliest Upper Palaeolithic phases (Gravettian and Solutrean) the contribution of marine bivalves seems to be limited, reflecting very low taxonomic diversity. Bivalve remains show a marked increase in number and also in diversity from the Late Solutrean to the Neolithic, with special relevance in the Epimagdalenian. Mussels were the most exploited taxa throughout the entire sequence, although clams and cockles were also collected for food. The systematic collection of mussels is explained by the authors as relating to the rocky shore morphology resulting from rising sea levels during the Late Pleistocene which provided the appropriate ecological niche for gathering mussels. Apart from using bivalves as food, shells were also collected post-mortem from the beach, perhaps to be used as containers or lamps, although no functional analysis was performed by the authors to support this statement.

The paper authored by Prendergast et al. (2016) is a pioneering study to obtain seasonal shellfish foraging data in North Africa using shell oxygen isotope ratios. Using a modern sample, the authors first validated the use of oxygen isotope ratios of the topshell *Phorcus turbinatus* as a palaeoenvironmental recorder and seasonality marker. They then applied oxygen isotope analysis to archaeological samples from Haua Fteah (Libya). Results showed significant changes in foraging patterns along the sequence, from the Epipalaeolithic to the Neolithic. During the Early Epipalaeolithic (Oranian), topshells were foraged year-round, while from the Late Epipalaeolithic (Capsian) to the Neolithic, shellfish were predominantly collected during the winter. These results, when combined with other archaeological evidence, offer strong support for the hypothesis that this region served as a refuge for human populations in the Early Epipalaeolithic when the surrounding regions were too cold to support large populations. The seasonal pattern of shellfish exploitation in the region during the Holocene may have been influenced by the seasonal availability of other resources during these times, with shellfish possibly being used as a dietary supplement when other foods were less abundant.

### 2.3. Mesolithic

Regarding the Mesolithic, five papers have been published in this special issue relating to procurement patterns and continuity of coastal resource use, addressing topics such as the symbolism of shell beads, species selection, and the use of Bayesian

chronological modelling to study the formation timing of shellfish-rich archaeological deposits.

The two papers authored by Fernández-López de Pablo (in this issue) and Fernández-López de Pablo & Gabriel (2016), focus on the exploitation of littoral resources during the Mesolithic period at El Collado site, in the central Mediterranean region of Spain. The first paper aims to reconstruct the site's archaeological sequence using a new Bayesian chronological model to estimate the formation time and duration of three stratigraphic phases. After a critical analysis of the radiocarbon record, including the presentation of six new AMS radiocarbon dates from previously undated stratigraphic horizons, the modelled chronology indicates the presence of Early Holocene occupations from the bottom (9828–9551 cal BP) to the top of the sequence (8499–8060 cal BP), during a period of major regional eustatic changes when the flooding of coastal plains created new biotope conditions.

The detailed analysis of El Collado's mollusc and fish bone assemblages is the subject of the second paper. The authors report a pattern of shellfish exploitation clearly focused on lagoon-inhabiting bivalves (especially *Cerastoderma glaucum*) and gastropods, whereas the fishing activities seem dominated by the sea bream (*Sparus aurata*). The study also indicates strong fluctuations in the relative frequencies and shell size of *C. glaucum* which may be explained by short-term fluctuations in biological marine productivity in coastal lagoon biotopes. Another interesting finding is the significant representation of edible land snails. This mixed marine–terrestrial shell midden composition recalls the recently described Capsian site of SHM-1 in Hergla, Tunisia (Mannino and Mazzanti, 2013).

Gutiérrez-Zugasti et al. (2016) analyse the crustacean and echinoderm remains recovered from the Mesolithic shell midden site of El Mazo (northern Spain). They found a quite stable procurement pattern through time, which suggests that these resources were a regular, stable food source. However, they also found that collection was carried out at a low intensity compared to other intertidal resources such as molluscs. This pattern has usually been interpreted from a quantitative perspective, implying that sea urchins and crustaceans were opportunistic resources. However, given the pattern of continuous exploitation exhibited by these resources in northern Iberia and other areas of Atlantic Europe, a qualitative perspective of interpretation could be employed. Thus, the authors suggest that sea urchins, goose barnacles and crabs could have been sought after as delicacies involved in the celebration of social activities, which would increase their social significance and general importance.

The paper by Rigaud and Gutiérrez-Zugasti (2016) focuses on the same geographical area and chronology as the previous paper, aiming to shed some light on the social organization of the last hunter–gatherers in the region. By investigating raw material procurement, selection strategies and manufacture processes of personal ornaments from the Mesolithic shell midden sites of El Toral III and El Mazo, the authors show that the Asturian shell bead production was disconnected from marine resource exploitation for both economic and technical purposes. All the technical steps required for bead production were conducted at the sites, from shell collection to bead manufacture and use, suggesting absence of segmentation in the stages of shell bead manufacture during the Early Holocene. The authors also compare ornamental shell assemblages of these coastal sites with those from inland foraging societies developing distinct economies and different funerary rites. The presence of common associations of bead types within these societies depicts the interaction networks that may have existed during the Mesolithic in northern Iberia.

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