

## 22. Current research on prehistoric human coastal ecology: Late Pleistocene and Early Holocene hunter-gatherer transitions in north-west Sicily

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*The numerous caves of north-west Sicily often have Upper Palaeolithic and Mesolithic occupation, along with food remains, especially substantial accumulations of marine shells. These shellfish assemblages are being used to investigate prehistoric human ecology and subsistence in this Mediterranean coastal region, from the Upper Palaeolithic, through the Mesolithic and into the Neolithic. Shells are also being used to obtain AMS radiocarbon dates for critical levels at important sites. This paper presents preliminary results on the seasonality of shellfish collection, based on oxygen isotope analysis of the marine gastropod *Monodonta turbinata*, which are interpreted in relation to environmental, palaeoeconomic and cultural transitions from the Late Pleistocene to the mid-Holocene.*

Keywords: north-west Sicily, Upper Palaeolithic, Mesolithic, coastal ecology, shellfish exploitation, seasonality, Addaura caves, Grotta di Cala dei Genovesi, Grotta dell'Uzzo, *Patella ferruginea*, *Monodonta turbinata*.

### Introduction

North-western Sicily is characterised by coastal limestone hills, rich in caves and rockshelters that were occupied in prehistory (Figure 22.1). Numerous caves have yielded surface scatters or stratified finds, including assemblages of lithics, animal bones and marine shells. A few also contain human burials. On the basis of lithic typologies, the initial occupation of many of these sites has been attributed to the final stages of the Upper Palaeolithic (which in Italy is termed the Epigravettian). The few absolute dates available (Skeates 1994), confirm the estimation of the initial occupation of these caves to the Upper Palaeolithic. There is relatively less evidence for the Mesolithic, because the cave deposits have been subject to substantial disturbance, usually arising from pastoral activities or to the recent use of these shelters for human habitation. Many caves were used until recently for keeping sheep (some are still being used in this way) and periodically the dung accumulations within them had to be dug out, with the uppermost archaeological deposits also being removed or severely disrupted. Over time, this has caused the destruction of progressively older deposits. Another reason for the *apparent* scarcity of Mesolithic deposits is that the early Holocene lithic industries of Sicily closely resemble those of the Final Epigravettian. Artefact types such as geometric microliths occur in both Epigravettian and early Mesolithic assemblages (e.g. Segre and Vigliardi 1983;

Lo Vetro and Martini 1999–2000) and Martini (1997) has grouped Sicilian 'Mesolithic' assemblages into the category *Epigravettiano indifferenziato*. In consequence, it has proved difficult to identify early 'Mesolithic' occupation at sites from lithic assemblages, and it is likely that the number of sites of this period has been underestimated (Tusa 1999). In this paper we will refer to Early Holocene occupation horizons as 'Mesolithic'. Deposits of Mesolithic age have been identified by radiocarbon dating at the Grotta dell'Uzzo, Grotta di Cala dei Genovesi and Grotta Molara (Tusa 1999).

Various important transitions in the environment, caused by changes operating at the global scale and influencing climate, vegetation, faunas, etc., must have occurred during the periods when the caves of north-west Sicily were occupied, but there is currently little local evidence for these. Sea levels rose as a consequence of global warming, leading to the progressive submergence of coastal areas such as, for example, the stretch of land attaching the Egadi Islands (Levanzo and Favignana) to the mainland (Antonioli 1997). The only pollen sequence available for Sicily is from Lake Pergusa in the centre of the island (Sadori and Narcisi 2001). It shows that tree cover extended significantly in the Postglacial and, by the Late Mesolithic, had probably reached the coastal hills in which most of the cave sites are located. A recent study of a speleothem from the Grotta di Carburangeli, near Carini, showed evidence



Figure 22.1. Map of north-west Sicily showing the location of some of the prehistoric coastal sites, including those mentioned in the text. The Grotta di Cala dei Genovesi is one of a cluster of sites identified as 'Grotte di Levanzo', on the west coast of the island of Levanzo.

of climatic instability during the Holocene (Madonia *et al.* 2005), with an early Holocene humid phase being followed by a prolonged phase of greater aridity from around 6000 BP. In this paper, we consider whether human subsistence behaviour changed as a result of the environmental changes that occurred between the end of the Pleistocene and the early to mid-Holocene, even though there do not appear to have been significant differences in the lithic assemblages over this period.

#### *Epigravettian and Mesolithic deposits*

Our research is specifically concerned with shellfish exploitation, based mainly on the study of materials from sites that have been excavated in the last sixty years, now stored in the Archaeological Museum in Palermo. The first step was to select those sites that had been excavated to acceptable standards, among which are the Addaura cave complex, the Grotta di Cala dei Genovesi and the better-known Grotta dell'Uzzo. *Monodonta turbinata* (topshells) have been selected from these sites for accelerator mass spectrometry (AMS) radiocarbon dating, to provide an absolute chronology for the sites and for the phases of shellfish exploitation. For the Grotta dell'Uzzo, the dates on shells of *M. turbinata* selected from the sequences of Trench A and Trench Fare (after correction for the marine reservoir effect and calibration) fully consistent with the absolute chronology previously obtained from combined charcoal samples for the Mesolithic and Neolithic layers. This is discussed in more detail by Mannino *et al.* (2006; 2007), who conclude that the shell-based AMS dates are reliable. The dates from the Addaura caves and from Grotta di Cala dei Genovesi will be discussed below, in relation to each site, although a more detailed account of these

sites will be published elsewhere (Mannino and Thomas, in press).

#### *The Addaura Caves*

The Addaura Caves are located on the north-eastern slopes of Monte Pellegrino (Figure 22.1). Three caves are of particular interest for their prehistoric deposits: the Grotta Addaura Caprara, the Grotta dei Bovidi and the Grotta delle Incisioni. This last cave is famous for the rock art scene depicting a number of human figures 'dancing' around two central figures. In 1946–7 Jole Bovio Marconi, in collaboration with Luigi Bernabò Brea, excavated four trenches within these caves or just outside them (Bovio Marconi 1946). Trench III, excavated in the talus of the Grotta delle Incisioni, is the most interesting one in terms of the shellfish remains. The deposit was mixed down to about a metre, but was deemed by the excavators to be *in situ* from around 1.40m. The finds from these levels confirmed the probable integrity of the deposits. Shells of *M. turbinata* were selected to date three consecutive spits (Spit 13, Spit Bis 1 and Spit Bis 2). The calibrated dates (2- $\sigma$  range) are, respectively, 11,780–11,410 cal BC, 11,880–11,530 cal BC and 12,070–11,780 cal BC, confirming the assemblages as Final Epigravettian. Trench IV, at Grotta Addaura Caprara, contained Mesolithic materials, although the deposit was partly mixed. A shell from the second lowermost spit (Spit 25) of this trench has been dated to 930–8620 cal BC, making it Early Mesolithic.

#### *Grotta di Cala dei Genovesi*

The Grotta di Cala dei Genovesi is situated on the island of Levanzo in the Egadi archipelago off the north-western

tip of Sicily (Figure 22.1). The materials examined in this project are those from Bovio Mareoni's excavation of Trench I (Bovio Mareoni 1952). This trench was opened in an area in which Graziosi later excavated, and from which herecovered Upper Palaeolithic and Mesolithic lithic assemblages (Vigliardi 1982) and animal bones (Cassoli and Tagliacozzo 1982), as detailed by Mannino *et al.* (2007). The materials from Bovio Marconi's and Graziosi's trenches are similar, which is not surprising given the contiguity of the two trenches. Shells of *M. turbinata* from three spits (Spits 6, 10 and 12), distributed through the stratigraphic sequence, have produced dates of 6800–6450 cal BC, 10,380–9790 cal BC and 10,910–10,710 cal BC, spanning the Mesolithic and Final Epigravettian.

### Prehistoric marine mollusc exploitation

The shell-based AMS dates have shown that shellfish collection in the region dates at least from the Final Epigravettian (at the Addaura caves, Grotta di Cala dei Genovesi and also other caves, such as Grotta Niscemi). Ongoing studies on the mollusc assemblages from the Addaura caves, Grotta di Cala dei Genovesi and Grotta dell'Uzzo indicate that shellfish were relatively important resources, both at the end of the Upper Palaeolithic and at the beginning of the Mesolithic. The shellfish exploited for food were almost invariably rocky shore inter-tidal mollusc species and the main taxa collected were species of limpet (*Patella ferruginea*) and *M. turbinata*. The most noticeable difference in the assemblages between the Upper Palaeolithic deposits of the Addaura cave (Mannino and Thomas, in press) and the Mesolithic deposits of the Grotta dell'Uzzo (Compagnoni 1991) is a drop in the numbers of limpets, the largest and probably the most desirable inter-tidal mollusc to be found on the rocky shores of the Mediterranean. A reduction in abundance of this species has also been observed at other sites (e.g. Durante and Settepassi 1972) and could be due to the impact of human exploitation. Preliminary data also show a reduction in the mean size *M. turbinata* from the Upper Palaeolithic (Addaura caves) to the Mesolithic (Uzzo cave); this is currently being studied in more detail. Another important issue being investigated is if there were any differences in the patterns of shellfish exploitation between the Epigravettian and the Mesolithic. For example, was exploitation all year round or seasonal, and in which seasons?

Stable oxygen isotope analyses on *M. turbinata* from a number of sites, including the three discussed in this paper, have been undertaken. The methods employed for the isotope analyses and interpretation of season of collection are explained in detail elsewhere (Mannino *et al.* 2007). The results of the oxygen isotope analyses on shells from Final Epigravettian deposits at the Grotta delle Incisioni (Addaura) and the Grotta di Cala dei Genovesi (Figure 22.2) clearly demonstrate that the collection of *M. turbinata* and, by inference, of the other inter-tidal species present, occurred during restricted 'seasons' of the year. At the Grotta delle Incisioni, collections were mainly in the winter, with some in the autumn (Figure 22.2). At the Grotta

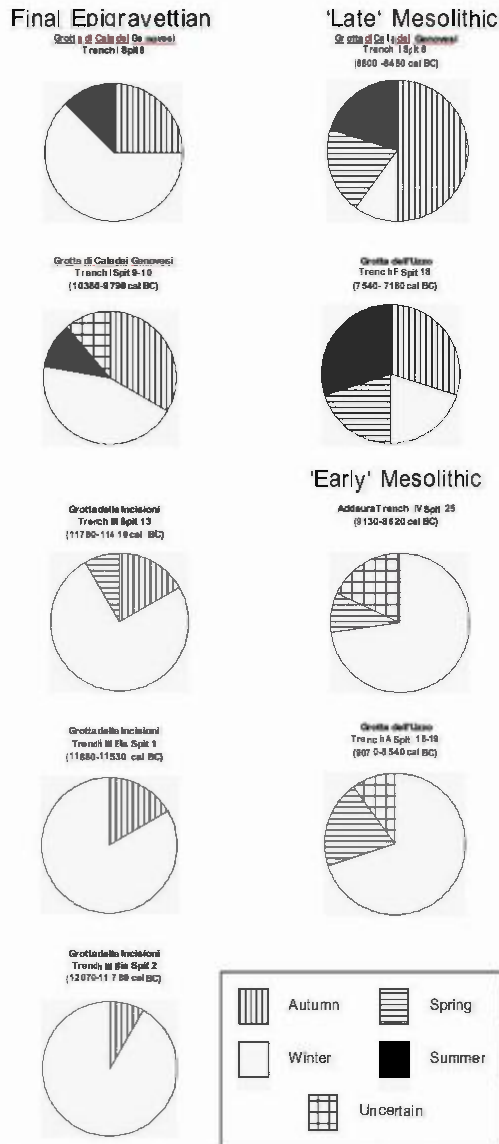


Figure 22.2. Pie charts showing patterns of infrared seasonal exploitation of inter-tidal shellfish (*Monodonta turbinata*) during the Final Epigravettian (at the Grotta di Cala dei Genovesi and the Grotta delle Incisioni), the 'Early' Mesolithic (at the Grotta Addaura and the Grotta dell'Uzzo) and the 'Late' Mesolithic (at the Grotta di Cala dei Genovesi and the Grotta dell'Uzzo). Seasonal attributions made on shell-edge oxygen isotope values, as detailed by Mannino *et al.* 2007.

di Cala dei Genovesi winter, followed by autumn, are the main collecting seasons, with some collection in summer. The evidence for the 'Early' Mesolithic at the Addaura and Uzzo caves shows that winter was still the main season of



collection, with some exploitation in the spring. In marked contrast, the evidence from both the Grotta dell'Uzzo and from the Grotta di Cala dei Genovesi suggests that shellfish collection in the 'Late' Mesolithic occurred in all seasons. In the case of the former site, collection was evenly distributed through the year, while for the latter autumn was the dominant season of collection.

The results of the seasonality studies from these sites indicate that at the time of the most significant environmental change (between the end of the Pleistocene and the Early Holocene) there was no significant change in the seasonal pattern of shellfish collection (between the Final Epigravettian and the 'Early' Mesolithic). Within the Holocene, however, a significant change occurred, with shellfish becoming exploited in all seasons. It appears that marine molluscs were being exploited in more restricted seasons when they were probably more abundant, but later, when less abundant, they were being exploited in all seasons. Or, putting it the other way round: early on, highly seasonal exploitation of shellfish had no detectable impact on the abundance of this resource, while later, increased exploitation through the year caused a significant decline in inter-tidal shellfish populations. This interesting association is still being investigated, alongside the evidence for other components of the subsistence economies (Mannino and Thomas, in press).

#### **'Transitions' in subsistence strategies through the Mesolithic**

The evidence for Mesolithic food economy in the region comes from the Grotta dell'Uzzo (Tagliaozzo 1993), the Grotta di Cala dei Genovesi (Cassoli and Tagliaozzo 1982) and the Grotta d'Oriente (Mannino 2004; Mannino and Thomas 2004). Only limited data are available for the latter two sites, but the abundant animal remains from the Grotta dell'Uzzo show that the later part of the Mesolithic was characterised by a wide array of food species, including small animals, fish, and birds, with the addition of marine mammals rather later on. Increase in human population is a frequently invoked 'explanation' for a broadening of the spectrum of resources exploited. Is there any evidence for this in this region? As noted above, Mesolithic sites are likely to be underrepresented in north-west Sicily, but there is no reason to suppose that they ever exceeded in number the Final Epigravettian ones. There is, therefore, no basis for hypothesizing a demographic increase. From the limited evidence available, it appears that changing environmental conditions linked to the impact of human predation pressure might have had an effect on resource diversity and abundance. The reduction in the seasonality of exploitation of resources seen at some sites (discussed above) could indicate reduced food security and therefore a need to exploit different types of resources and habitats with increased frequency, rather than focussing on a restricted range of seasonally dependable resources and habitats (as appears to have happened in the Final Epigravettian and 'Early' Mesolithic).

The shift towards a broader spectrum of resources at the Grotta dell'Uzzo has been interpreted as indicating increased sedentism (Piperno 1997; Tusa 1999) and as a sign of increased food availability. The seasonal data presented here, indicating exploitation of resources in all seasons of the year, could be taken as supporting this view. The adoption of a broad-spectrum diet could, however, be the result of a range of complex ecological and social processes, some of which we note in the previous paragraph. Important factors to consider are: the ecological potential of Mediterranean environments, the fact that Sicily is an island and the potential effects of prolonged human pressure on the main food resources. Mediterranean environments have high levels of biodiversity but low primary productivity (Allen 2001, 145). Much of the terrestrial vegetation is woody and sclerophyllous (Biondi and Aronson 1999) and difficult for browsing animals to digest. Therefore, the establishment of a typically Mediterranean climate, with its marked seasonality of production and leading to the development of the typical Mediterranean-type woodland and *macchia* vegetation, could have posed problems for hunter-gatherers. Moreover, although Sicily is a large island close to the mainland, its isolation had filtered the species of mammals which could reach it at the height of the last glacial period, producing an impoverished mammalian faunal complex compared with continental Italy (Burgio 1997).

Because of poor preservation and recovery, little can be said about the importance of plant foods. From an analysis of a bladder stone from one of the burials at the Grotta dell'Uzzo, D'Alessio *et al.* (2005) suggested that plant foods might have been important in the diet of that individual. Based on the animal bones present at most sites, the main sources of protein were probably terrestrial mammals and in particular large herbivores. However, as Tagliaozzo (1993) has noted for the territory around the Grotta dell'Uzzo, by the very end of the Mesolithic wild equids and bovids were becoming rare, and cervids appear to have become depleted by prolonged human exploitation.

Shellfish resources, although abundant in Mesolithic deposits in the region, do not have high population numbers or densities on the local shores when compared with, for example, shores along the Atlantic façade. This is because the biological productivity of the Mediterranean Sea is among the lowest in the world (e.g. Estrada *et al.* 1985) and also because tidal amplitude in the Mediterranean is extremely narrow, a factor which restricts the space available to inter-tidal mollusc species, making them highly susceptible to local over-exploitation. The long-term and intensive exploitation both limpets and *M. turbinata*, as indicated by assemblages in caves all along the coast from Termini Imerese to the Egadi Islands (Figure 22.1), could have had an effect on the availability of such animals.

Other inter-tidal animals and shallow water animals (such as sea urchins (Echinoidea) and crabs, probably constituted minor sources of food. There is little evidence that marine fish were exploited to any significant degree until the Late Mesolithic, while at the Uzzo cave these

resources became progressively more important from the end of the Mesolithic. Marine mammals are very rare in these sites. Seals (Phocae) were occasionally hunted and cetaceans found stranded, and were not necessarily consumed. Species of large edible land molluscs might have been favoured by the more humid conditions of the Late Pleistocene and Early Holocene (Preboreal), judging by the increase in their exploitation throughout the Mediterranean at that time (Luhell 2004). With the increased aridity of the Boreal, possibly coupled with the effects of local over-exploitation, they were being collected less abundantly by the later Mesolithic, at least at the Uzzo cave (Compagnoni 1991).

### Developing territoriality?

In general, when compared to large game animals, lower-ranked resources are found at higher population densities in more restricted habitat patches, and their exploitation requires frequent movements within defined areas or territories. The trends observed in the seasonality data from the Addaura caves, Grotta di Cala dei Genovesi and Grotta dell'Uzzo are compatible with these needs and with the necessity to secure specific resource patches through social mechanisms (as discussed by Mannino and Thomas, elsewhere in this volume). This scenario would suggest the existence of well-defined, customary territories within which Mesolithic hunter-gatherers moved to exploit predictable and localised resources.

A 'new' territorial division, or the development of recognised territorial rights of access to specific resource patches, would have affected many aspects of hunter-gatherer ways of life, not only subsistence. The perception of the environment probably changed, and space (comprising combined resource patches) might itself have become directly perceived as a 'resource', not only because extensive coastal areas were being submerged by rapidly rising sea levels (Antonoli 1997), making resource spaces smaller or more restricted, but also because increased arboreal cover on the hills would have made internal areas less readily accessible and less productive.

Other spheres of hunter-gatherer culture also changed in the Mesolithic of the region. Rock art changed from the naturalistic style of the late Upper Palaeolithic to the more schematic and abstract forms of the Mesolithic. There was an increase in portable art objects (Pluciennik, 1994), which might also reflect increased mobility. The use of caves appears to have changed during the Mesolithic, from having probably been inhabited in the Epigravettian, to being increasingly used as burial places towards the later stages of the Mesolithic, as seen at the Grotta dell'Uzzo, Grotta Molara and Grotta d'Oriente (Mannino 2004; Mannino and Thomas 2004).

### Conclusions

Our research is showing that, as for other areas of the Mediterranean such as Spain, southern Italy and Greece

(Bailey 2004), the exploitation of marine molluscs in Sicily dates at least from the final stages of the Late Pleistocene. Shellfish exploitation continued into the Mesolithic, generally in much the same way as in the Final Epigravettian. From our investigations of the mollusc faunas and our review of other sources of evidence, the most significant transitions in the hunter-gatherer way of life did not occur in the transition to the Holocene, but during the Holocene itself, specifically from the later stages of the Mesolithic onwards. In the light of our argument that resources were not abundant in the Late Mesolithic, looking ahead to the next major cultural and economic transition in the region, we suggest that the arrival of herding and farming was unlikely to have been resisted.

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