Muge 150th

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The 150th Anniversary of the Discovery of Mesolithic Shellmiddens—Volume 2

Edited by

Nuno Bicho, Cleia Detry, T. Douglas Price and Eugénia Cunha

Cambridge Scholars Publishing

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FOREWORD

During the month of March, 2013 a team from the University of Algarve, organized an international conference, MUGE150th - The 150th Anniversary of the discovery of the Mesolithic Shell Middens, held in Salvaterra de Magos, celebrating the discovery of the shell middens a century and half before by the geologist Carlos Ribeiro and his team from the Portuguese National Geologic Services.

During those four days, close to 100 papers and posters were presented, resulting in a two volume proceedings published by Cambridge Scholars Publishing. While the first volume focused on the Mesolithic from both Muge and Sado valleys, the present Volume with a total of twenty two chapters, combines a series of papers on the Mesolithic and the transition to the Neolithic from all over Europe, including Denmark, France, Germany, Ireland, Portugal, Spain, Servia, Sweden and UK, as well as a series of general papers presenting methodological or theoretical aspects on the Mesolithic. In addition to those, the last few chapters of this Volume 2 are outside of the realm of the European Mesolithic-Neolithic world, presenting case studies on shell middens from Patagonia and the Red Sea.

The organization of the conference and the publication of the Proceedings were only possible due to the interest and help of Casa Cadaval, the estate where many of the Muge Shell Middens are located, the funding by Câmara Municipal de Salvaterra de Magos and the CIAS - Research Centre for Anthropology and Health, from the University of Coimbra.

Finally, it should be said that the work that started in 2008 by the University of Algarve team was funded by Fundação para a Ciência e Tecnologia (the Portuguese Science Foundation) for two sequential research projects, *The Last Hunter-gatherers in the Tagus Valley - The Muge Shellmiddens* (PTDC/HAH/64185/2006) and *The last hunter-gatherers of Muge (Portugal): the origins of social complexity* (PTDC/HIS-ARQ/112156/2009). All new data from Cabeço da Amoreira that provided the basis for the new interpretations and revisions of earlier data were obtained during the course of those two projects and largely presented in the meetings in 2013.

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CHAPTER ONE

A FEW STEPS BACKWARDS … IN SEARCH OF THE ORIGINS OF THE LATE MESOLITHIC

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Abstract

Roughly about 8300 cal BP, during the transition to the late Mesolithic (ca 8300-7200 cal BP), the Portuguese territory was the stage of a major reorganisation of human settlement. This had implications for other aspects of the daily lives of human communities distancing them from the behavioural patterns of the precedent local populations (from the Early Mesolithic; ca 11500-8400 cal BP). The explanation for the origins of such changes has been mainly focused on environmental factors which have possibly pushed human communities to the innermost areas of the large estuaries formed during the Atlantic chronozone. The abundance and diversity of food resources would therefore have provided for a more sedentary, steady and sustainable lifestyle.

However, and merely by taking a few steps back, other cultural evidence and taphonomic problems can also be applied in support of a more substantiated and realistic picture of the historical process.

Preliminary Remarks

Two different terms designate the time of the last hunter-gatherer societies in Portugal: the early (ca 11500-8400 cal BP) and the late Mesolithic (ca 8300-7200 cal BP). Both phases deviate from the behaviour patterns that characterise the preceding and succeeding periods–that is, the

Upper Palaeolithic and the early Neolithic–but there are also some important differences between them that make this division necessary and pertinent.

The boundaries suggested here for the beginning and the end of both Mesolithic phases carry the uncertainty to be expected in any chronology based on radiocarbon dating as a result of measurement precision and reservoir effect and calibration issues, compounded and increased by archaeological factors: insufficiently studied/published collections and sites, non-diagnostic find contents (often made up of shells only), problems related to taphonomic process, etc. These constraints make it impossible to determine with accuracy the cultural status of a number of sites.

Different reservoir effects have been applied to calibrate radiocarbon dates from marine shells over the last two decades (e.g. Soares 1993, Soares and Dias 2006). A weighted mean of 95±15 ^{14}C years has been recently considered to be the most adequate ΔR value to calibrate marine shells recovered in sites located along the western coast of Estremadura, Alentejo and Algarve (Monge Soares, pers. comm.). In the case of the Tagus (Muge and Magos) and Sado shell midden sites, nowadays located in the innermost areas of their palaeoestuaries, the ΔR values used to calibrate radiocarbon ages are respectively 140±40 and −100±155 ^{14}C years (Martins *et al.* 2008).

The Late Mesolithic

Even today, 150 years after the discovery of Muge, discussing the Portuguese Mesolithic is the same as discussing the shell middens located in the Tagus and the Sado valleys. It is definitely from this cluster of sites that researchers have been constructing the history of Holocene hunter-gatherer communities. After decades of research, these shell middens are still considered to be the main examples of the Mesolithic way of life. As a result, these are also the sites that have attracted the attention of Portuguese and foreign research producing the major and most diverse range of chronometric, environmental, dietary and anthropological information. However, despite the efforts invested in research concerning the Mesolithic of the Tagus and Sado valleys, critical and comparative studies between radiocarbon dates, shell midden sites and occupational contexts at both intra and inter site level are still missing.

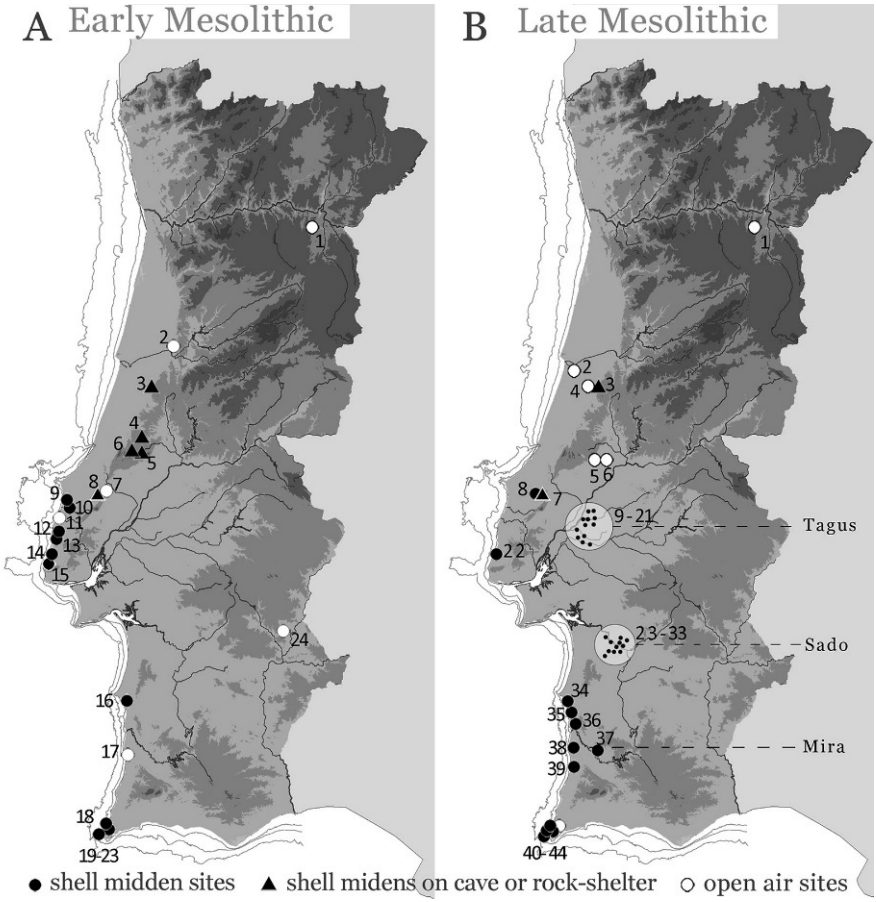

Fig. 1.1 **A**. Early Mesolithic settlement: 1. Prazo; 2. Vale Sá; 3. Buraca Grande; 4. Casal Papagaio; 5. Lapa do Picareiro; 6. Pena de Mira; 7. Areeiro III; 8. Bocas 1; 9. Vale Frade; 10. Toledo; 11. Ponta da Vigia; 12. Cabeço do Curral Velho; 13. Pinhal da Fonte; 14. São Julião (A et B); 15. Magoito; 16. Oliveirinha; 17. Palheirões do Alegra; 18. Castelejo; 19-23. Barranco das Quebradas 1, 3, 4, 5 and Rocha das Gaivotas; 24. Barca do Xerez de Baixo. **B**. Late Mesolithic settlement: 1. Prazo; 2. Forno da Cal; 3. Pelónia; 4. Buraca Grande. 5. Costa do Pereiro; 6. Pessegueiros; 7. Bocas 1; 8. Forno da Telha; 9-21. Tagus shell middens (13 sites: Muge and Magos tributaries); 22. São Julião C; 23-33. Sado shell middens (11 sites); 34. Vale Marim; 35. Samouqueira1; 36. Vidigal; 37. Fiais; 38. Medo Tojeiro; 39. Montes de Baixo; 40. Castelejo; 41. Armação Nova; 42. Rocha das Gaivotas; 43. Monte do Azureque; 44. Vale Boi.

Late Mesolithic sites show a very standardised location (Fig. 1.1B): they occupied what was at that time the innermost areas of the large estuaries shaped during the Flandrian transgression, on or near the banks of the major Portuguese rivers (e.g. Arnaud 1986; Zilhão 1993).

Additionally, sites are organised in nuclei (containing several shell middens) within these estuarine areas. Over the long time that they were occupied (several centuries, for both the Tagus and Sado sites), these places provide evidence for the exploitation and consumption of a diverse range of food resources of marine and terrestrial origin (which has been additionally confirmed by trace-element analyses and the isotopic composition of human bones recovered at these sites–Lubell *et al.* 1994; Umbelino 2006), as well as the technical means required to perform these tasks. All the structural categories produced during the successive stages of the *chaîne opératoire* are represented (Araújo 1995/97; Marchand 2001; Carvalho 2009), with special emphasis on the massive production of geometric armatures, one of the main cultural traits of this phase.

Although being dwelling places for the living, several late Mesolithic shell middens were used as burial sites: the minimum number of individuals recorded so far is impressive (surpassing 400, considering both the Tagus and the Sado), but the number is probably higher, with all age groups well represented (Cunha and Cardoso 2002/03; Umbelino 2006). The type of location, number of sites, abundance and diversity of material culture, the presence of burials and domestic features (post-holes, fireplaces and huts) have all been used as arguments to support a certain degree of sedentary lifestyle of the Muge, Magos and Sado Mesolithic inhabitants.

If we extend the scale of analyses to the rest of Portugal (Figure 1.1B), the settlement map for the late Mesolithic shows a second cluster of shell middens in the Mira valley and, scattered along the littoral of Estremadura (central Portugal), Alentejo and Algarve regions (southern Portugal), other sites connected to the exploitation and consumption of marine foods, mostly shellfish. A little further inland, in Central Portugal, remains accumulated during this phase were also identified in open-air and cave contexts, some containing molluscs and other animal species of marine origin. Geometric armatures remain the most common tool-type among all these late Mesolithic sites.

An exception to the settlement pattern presented in Fig. 1.1 (B, 1) is the open-air site of Prazo (Monteiro-Rodrigues 2012), located in the interior of north-east Portugal, whose sequence encompasses a long history of human occupation. Can we really consider this site as an exception to the rule? And the rule is: late Mesolithic people preferred to

live near the sea or on the banks of the very large and productive estuaries formed during the Atlantic chronozone, close to the brackish-water molluscs. If this assumption is correct, then we are clearly facing a cultural choice. But, what if the preceding hypothesis is wrong and Prazo is, after all, the exception that proves the rule? If this is the case, the explanation for the empty spaces on the map should be sought from other factors such as research bias or taphonomic problems.

The general features presented above have been tentatively used to hypothesise patterns of late Mesolithic organisation (e.g. Arnaud 1986; Zilhão 1993; Bicho 1994; Soares 1996; Carvalho 2009). According to the most widespread perspective, these societies designed their daily lives by constructing different but complementary sites of both a residential and logistical nature, which would have been occupied throughout the annual cycle. The abundance and diversity of resources of these rich riparian habitats allowed a greater sustainability, anchoring people to these (their) new lands. Logistical sites were regularly visited to obtain specific food items or to assure other particular needs. Base camps would have functioned as the enduring residence where the living developed multiple activities and where the dead were buried. After centuries of accumulation of Mesolithic remains, these places became more or less extensive either in height or in area. However, this broad picture masks some important aspects concerning late Mesolithic internal organisation which are not archaeologically visible. In fact, which social mechanisms were driven by these groups to maintain themselves within the same landscape? For instance, how did they solve problems related to over-exploitation, interrelationships and interchangeability between individuals and groups exploring (belonging to?) the same economic territory? Finally what led them to converge, at some point in time, on the same lands?

The Early Mesolithic

Among the 44 late Mesolithic sites presently known in Portugal, five were also occupied during the Early Mesolithic. The archaeological record of this earlier phase comprises 24 sites (Fig. 1.1A), mostly being shell middens. Early Mesolithic people also seem to have had a special preference for littoral habitats for their food resources, particularly molluscs, which are systematically present even in sites located inland, 50 to 60 km distant from the ancient coastline.

If we consider the main features of this phase we notice that (Araújo 2012):

- In shell midden sites currently located along the coast, occupation sequences begin systematically in the Early Mesolithic (during the Pre-boreal or the Boreal chronozones). In other words, there were no previous occupations of these sites;
- Most sites represent distinct and successive short occupational episodes related to the gathering and consumption of shellfish. Thus, the archaeological data comprise molluscs almost exclusively and occasionally some lithic artefacts, but these tend to be scarce and poor in technological variability. Mollusc species represented at each site reflect, above all, the biogeographic specificity of their locations (sandy or rocky substrates);
- In a few cases and these are really rare, shell middens accumulated during this phase reveal a broad spectrum diet. In addition to the molluscs, fish and other remains related to the exploitation of terrestrial species are present. No major changes were observed regarding mammal and fish remains between the early and late Mesolithic. The dominant mammal species were red deer, wild boar, roe deer, aurochs, lagomorphs and occasionally horse (e.g. Arnaud 1994; Detry 2007; Moreno-Garcia 2011). Fish were mainly represented by sea breams, sea basses and tope shark (Gabriel *et al.* 2012) The occurrence of such a diverse range of food resources, as well as some elementary domestic features, allows us to consider them as short-term residential camps where different kinds of activities have taken place;
- Stone tool production is restricted to some non-standardised flakes and heavy duty implements made from local raw materials. In some cases, however, there is a clear intention for the manufacture of small blanks, no bigger than chips. It is most likely that these tiny blanks correspond, in fact, to the lithic fraction of wooden composite tools and weapons produced from informal thick cores (Fig. 1.2A, 1, 2) or to using cores that could typologically be considered as *pieces esquillées* (Fig. 1.2A, 3) (Araújo 2012).

If we focus on early Mesolithic sites located inland, we observe that:

- The majority correspond to logistic sites in caves and rock shelters directed towards hunting activities. However, marine species, mainly molluscs (but also marine crustaceans), are systematically present in contexts where organic matter is preserved;
- The production of small bladelets for lithic barbs (Fig. 1.2A', 4, 5) is one of the main features that characterise the technology of these inland hunters. These small armatures, no bigger than chips (the *Areeiro* bladelets, transformed by slight fine marginal retouching), also seem to correspond to the very small parts of composite tools and weapons

produced from cores that, at their abandonment stage, show shapes that could typologically be considered as *carinated scrapers*, *thick-nosed scrapers* and *carinated burins* (e.g. Fig. 1.2A', 6) (Bicho 1994; Araújo 2012).

Further inland**,** early Mesolithic sites become extremely rare. In the absence of flint, a macrolithic-based solution is then adopted (Araújo and Almeida 2013). Local quartzite, quartz and diverse coarse-grained cobbles were exploited through expedient reduction strategies in order to produce flakes–rarely transformed into formal tools by retouching–and heavy-duty tools, which are the desired end-products.

Any attempt to model the early Mesolithic lifestyle outside the Estremadura region is strongly impeded by the lack of data. On the southern coast, for instance, the archaeological record is limited to the logistic sites related with the gathering and immediate consumption of marine foods (Valente and Carvalho 2009). For central Portugal, however, it is possible to draw an interpretative model of early Mesolithic organisation, which is based upon the following main features (Araújo 2012):

- A structural dependence on marine resources, which are systematically present even in sites located at a considerable distance from the ancient coastline. This fact implies,
- A high degree of mobility: people probably organised in small units of single-family type moving regularly from the littoral to the interior and the other way round. Consequently, there is,
- A new use of space and the adoption of different technological solutions (it seems that there are no recurrent standards) according to functional needs and to raw-material availability on each site.

This system, based on the specialisation and seasonal acquisition of subsistence items, required the adoption of technological solutions that facilitated mobility and that responded quickly and efficiently to intended functional needs. The systematic use of local raw materials is a common feature of early Mesolithic people, and is suggestive of a mobility strategy where, in clear contrast to food resources, lithic materials were very seldom transported. How did these groups organise themselves both internally and externally to secure their lineage as well as their cultural survival? This aspect of early Mesolithic archaeology is also something we still do not fully understand. But an answer to this question should help us understand the problems previously pointed out concerning the late Mesolithic colonisation of the major Portuguese estuaries of the Atlantic.

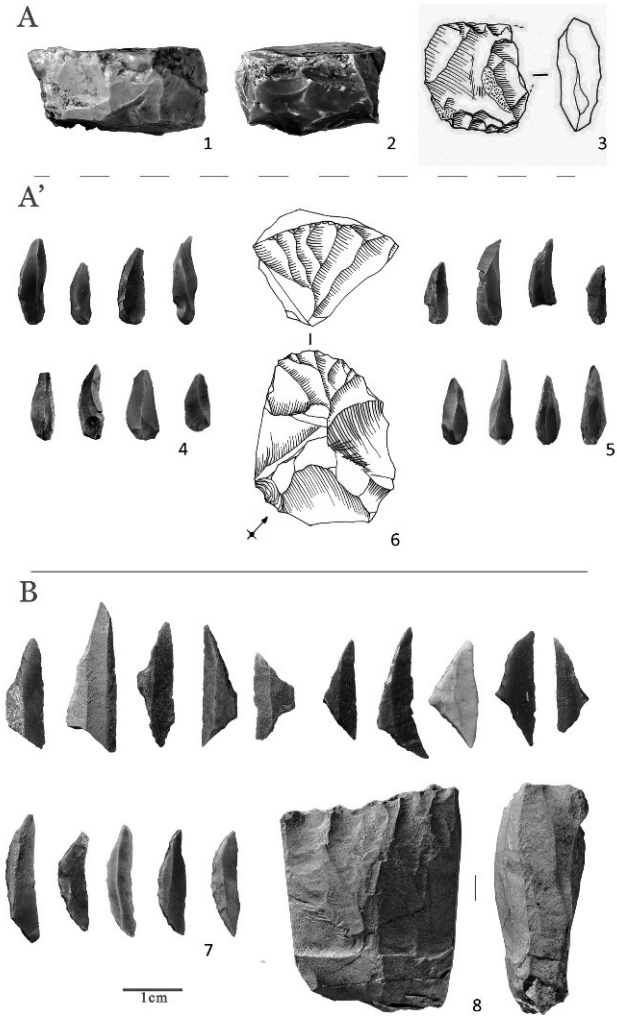

Fig.1.2. **A** (early Mesolithic). 1, 2: informal thick cores from Toledo shell midden (Figure 1A, 10); 3: *piece esquillée* core from Pinhal da Fonte shell midden (Figure 1A, 13). **A'**(early Mesolithic). 4, 5: Armatures from Areeiro III open air site (Figure 1A', 7); 6: Carinated type-core from Areeiro III used for bladelet production (the desired blanks for the *Areeiro* armatures); **B** (late Mesolithic). 7. Geometrics (trapezes, triangles and crescents) from Poças de São Bento, in the Sado valley (23-33); 8. Prismatic core (Sado valley) used for the production of bladelets (to be later reworked into geometric forms). Photos by J.P. Ruas and drawings by F. Botto.

What Finally Unites and Divides these two Mesolithic Phases?

It is reasonable to predict that the origins of changes occuring in the late Mesolithic should be sought in the previous phase. Comparing human settlement maps–and remembering the possibility that we may be facing truncated realities for both periods–the main difference between the two phases is the pioneer occupation, in late Mesolithic times, of the innermost sections of the major estuaries formed during the Flandrian transgression. It seems then, that this natural event would have provided new ecological conditions in those environments, which naturally attracted human groups who previously lived in other regions. In fact, no prior occupations are known in this assemblage of 26 shell midden sites recognised in the Tagus (Muge and Magos), Sado and Mira valleys. Nevertheless, this type of location does not differ in substance from the one that may be reconstructed for several early Mesolithic sites identified nowadays along the coast and nearby watercourses. In fact, at the time of their occupation, those places were also located in the interior of ancient estuaries. However, with little accurate knowledge of the early Holocene coastline dynamics, it is difficult to know exactly how distant the early Mesolithic shell middens were from the sea.

The choice of these estuarine habitats by Mesolithic groups of both phases is related to their great reliance upon marine foods, even though this varied in importance during the considered time-span and according to the geographical location of each site. The main difference in terms of settlement patterns between the early and the late Mesolithic relates to the organisation of sites within the landscape: mainly in nuclei, comprising several middens in the most recent phase; dispersed over the territory in the earliest phase.

These distinct settlement arrangements would have affected both the way people managed, planned and organised themselves socially and economically and also the emerging technical solutions adopted or adapted according to functional needs, technological traditions, mobility and raw material availability. The convergence of people within confined and ecologically rich environments would have triggered many of the late Mesolithic behaviours mentioned above, in particular the development of long-term residential sites, necropolises and a lithic technology directed towards the production of geometrics whose representation is ubiquitous (Fig. 1.2B). These characteristics have no parallels in the preceding archaeological record, characterised by logistic and short-term residential camps. In contrast with the later phase, these earlier sites were used by

itinerant groups selecting at each site, and according to local contingencies, the most adequate lithic techniques and procedures for tool production.

Three aspects should now be emphasised:

i) There is no population growth during the late Mesolithic (or data to support this hypothesis), but there is a concentration of people resulting from processes of fusion between formerly dispersed groups now joined by the banks of the large and very productive estuaries of the Atlantic;

ii) This does not mean, however, that the previous economic territories have definitely been abandoned. The apparent exodus of people from the littoral of Estremadura, for instance, should first be interpreted as the result of taphonomic problems related to coastline dynamics that would have erased possible traces of late Mesolithic activities. In fact, there is no reason to believe that people simply deserted their traditional economic territories. Moreover, there may be hidden sites under metres of Holocene sedimentation;

iii) Taphonomy alone does not explain, however, the rarity of Mesolithic sites in the most interior areas of Portugal. These areas were surely exploited by groups in the framework of logistical expeditions as other authors have already pointed out (Zilhão 1993; Carvalho 2009). The great reliance upon marine foods from the very beginning of the Holocene may explain the settlement pattern of Fig. 1.1 (A and B), thus reflecting past reality. It is important to note that after two decades of both rescue archaeology and Mesolithic oriented research those potential Mesolithic sites are still missing from the Portuguese archaeological record.

If similarities between both phases have been systematically underestimated, it is also true that something happened at some point in time, reshaping the previous establishment. Why this may have happened, and how the turning point can be placed, remain open questions.

Searching for the Why and the How

The Portuguese archaeological record is designated as late Mesolithic roughly around 8300/8100 cal BP. The oldest dates assigned to this phase come from sites located in different parts of central and southern Portugal, although they present some variations within these chronological limits. However, if we dismiss the radiocarbon data, it becomes difficult to place in time sites such as, for instance, São Julião C (Fig. 1.1B, 22) and Montes de Baixo (Fig. 1.1B, 39), since they have only provided mollusc remains. It is, however, within these chronological boundaries that researchers have established the frontier between both phases where the pioneer occupation

of the Tagus and the Sado valleys begins. Furthermore, the colonisation of these estuarine ecotones has been considered concomitant with a major reorganisation of human settlement (e.g. Zilhão 1993; Bicho 1994; Araújo 2003; Carvalho 2009), inducing changes in several aspects of human behaviour as mentioned above.

The arguments to explain this reversal in the history of Mesolithic people have focused on climatic factors that occurred roughly around 8200 years ago (Zilhão 2003; Carvalho 2008; Bicho *et al.* 2010). Among other impacts, the 5 Bond event (e.g. Bond *et al.* 1997) induced changes in sea water temperatures and a weakening of the thermohaline circulation which, in turn, caused a drop in upwelling intensity and, consequently, a decrease in marine productivity.

If nature always has something to tell, then so has culture. Accordingly, we should be more eclectic in our quest to reconstruct past human behaviours by bringing other arguments into the discussion. In fact, it is difficult to imagine that this climatic event constitutes the main factor responsible for this cultural change, the consequences of which at this latitude are far from being known in detail. Mechanisms of a social nature, for instance, may have also played an important role in this process. Humans live by their own functional rules in society, and have the means to support themselves and ways to secure their survival that do not depend exclusively upon natural circumstances. At that time, hunter-gatherers were already at the end of a cycle, following a long trend. We can hypothesise, for instance, that early Mesolithic social and economic organisation was no longer sustainable or could no longer respond to new human priorities. Moreover, a high level of itinerancy may have constrained lineage success. These hypothetical explanations, however, do not exclude the role of nature in human behaviour. A compromise between new environmental opportunities and new human needs may be closer to a more realistic reconstruction of the past.

If we look back in time, it is possible to trace some late Mesolithic behavioural characteristics within the former phase, such as the same preference for the innermost areas of estuaries and the dependence upon marine/estuarine resources. These affinities do not, however, extinguish the major differences that exist between them.

At some point in time which is impossible to determine precisely, these societies decided (and it is a matter of social decision) to reorganise the previous establishment within the landscape, within the different groups, and within their social relations. These new cultural landscapes became places of gathering and collective identity and the ultimate example is their long diachrony of occupation and the construction of places for the dead.

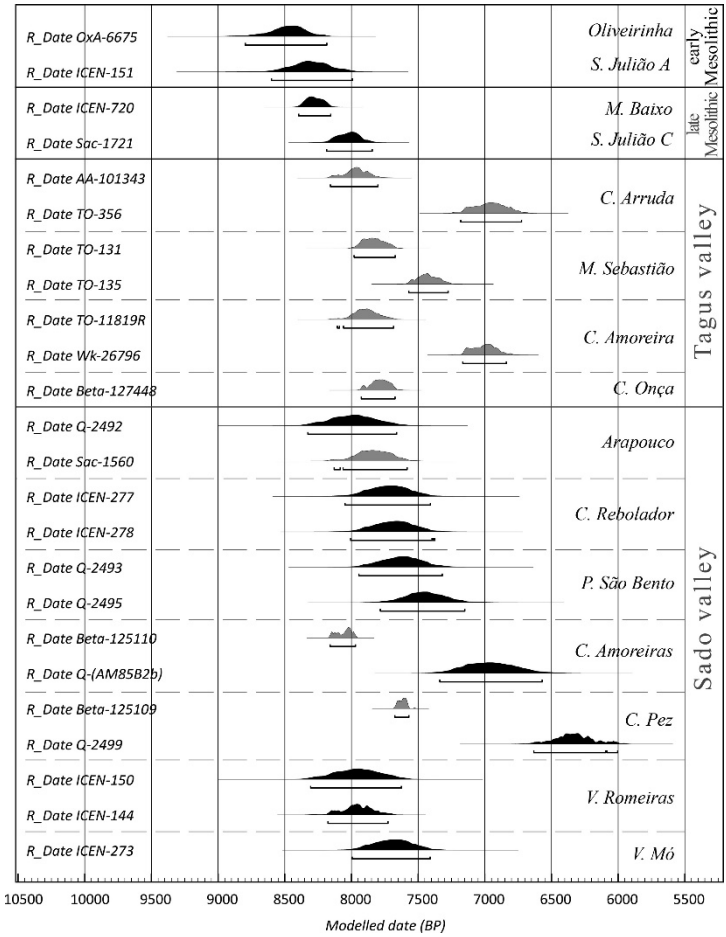

Fig. 1.3. Radiocarbon dates (cal BP, 95% confidence) for the early Mesolithic (the two latest sites) and the late Mesolithic (the two oldest sites), all of shell midden type. Grey colour represents samples on human bone collagen. Late Mesolithic of the Tagus and the Sado valleys is represented by the oldest and the most recent occupations identified at each shell midden (according to radiocarbon measurements). Calibrations use OxCal v. 4.2 (Ramsey, 2009) with intCal13 and Marine13 (Reimer et al., 2013). Different ΔR values were used: 95±15 14C (coastal sites: Oliveirinha, S. Julião A, M. Baixo, S. Julião C), 140±40 14C (Tagus sites) and -150±155 14C (Sado sites). Proportion of marine protein in diet was considered in the calibration of human bone samples. Note 1: radiocarbon dates from charcoal samples were excluded. Note 2: the latest date of C. Amoreira (Tagus) corresponds to a Neolithic burial (intrusive), according to Bicho et al., 2013.