Foraging Assemblages

Volume 1

Edited by Dušan Borić,
Dragana Antonović, and Bojana Mihailović

COLUMBIA UNIVERSITY
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Back Cover Illustration: Lepenski Vir during excavations (Photograph courtesy of Alan McPherron)

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24. Of space and time: The non-midden components of the Cabeço da Amoreira Mesolithic shell mound (Muge, central Portugal)

João Cascalheira, Nuno Bicho, Célia Gonçalves, Daniel García-Rivero, and Pedro Horta

Very little information is currently available on the internal layout and functional diversity of Portuguese Mesolithic shell middens. This is mainly due to the fact that previous work has focused mostly on restricted parts of the middens. New excavations at Cabeço da Amoreira, however, have strongly been concerned with the study of site formation processes and spatial organization. The most remarkable feature of this new work has been the identification of a series of non-midden, multi-stratified loci found in the immediate vicinity of the mound. In this paper, we present the general characteristics of the non-midden components regarding their stratigraphic context, artefactual composition, and chronological succession. Although preliminary, these data are of major importance with regard to two aspects of the Muge shell middens. First, they disclose the organization of the settlement during the Mesolithic, with shell middens no longer being regarded as simple, isolated base camp units. Second, this work identified a series of Neolithic occupations around the midden as an important element in our understanding of the complexity of the Mesolithic-Neolithic transitional process in central Portugal. This is linked to the question of the ultimate fate of these Mesolithic communities.

Keywords: shell middens, Mesolithic, Neolithic, Muge, Portugal

Introduction

In a recent paper, Gutiérrez-Zugasti *et al.* (2011) highlighted some of the major weaknesses in shell midden research across Atlantic Europe. Among others, one of the emphasized problems is the lack of knowledge about the existence of different functional areas inside and especially around shell middens. Even in northern Europe, in countries like Denmark, where the Mesolithic shell midden archaeology was established very early on (Andersen 2000) and dwelling structures have extensively been documented, traces of occupation in the proximity of and in association with shell middens have scarcely been reported. Factors like post-depositional processes, partial excavations, or the overall complexity of this type of sites might have created a bias in our knowledge concerning the internal characteristics of shell middens and their immediate surroundings, including data about their extension, volume, and spatial/functional organization.

In Portugal, this type of evidence has also been infrequently researched for years, both in the Sado and the Muge Mesolithic complexes. Especially during the 1930s (Mendes Corrêa 1933) and 1960s (Roche and Ferreira 1967), but even until recently, research efforts at Cabeço da Amoreira were mainly directed towards the excavation of the mound, and with particular focus on the recovery of human skeletal remains and burial contexts instead of identifying dwelling spaces or understanding the complete spread of human occupation.

With these problems in mind and in an attempt to define the extension of Cabeço da Amoreira more precisely, we used a hand auger to collect information on the geology and archaeological sequences around the main excavation area (Bicho *et al.* 2011) (Fig. 24.1). This process allowed us, on the one hand, to trace the approximate southern limits of the mound and, on the other hand, to identify previously unreferenced, shell-free occupation surfaces located in the surrounding deposits. In five of the spots where archaeological materials were recovered with the auger, test pits (one square metre) were excavated, and in four cases larger excavation areas were opened (Area 1, Area 2, Trench, Ribeira) (Fig. 24.1).

In this paper, we summarily describe these contexts and the main characteristics of the recovered findings.

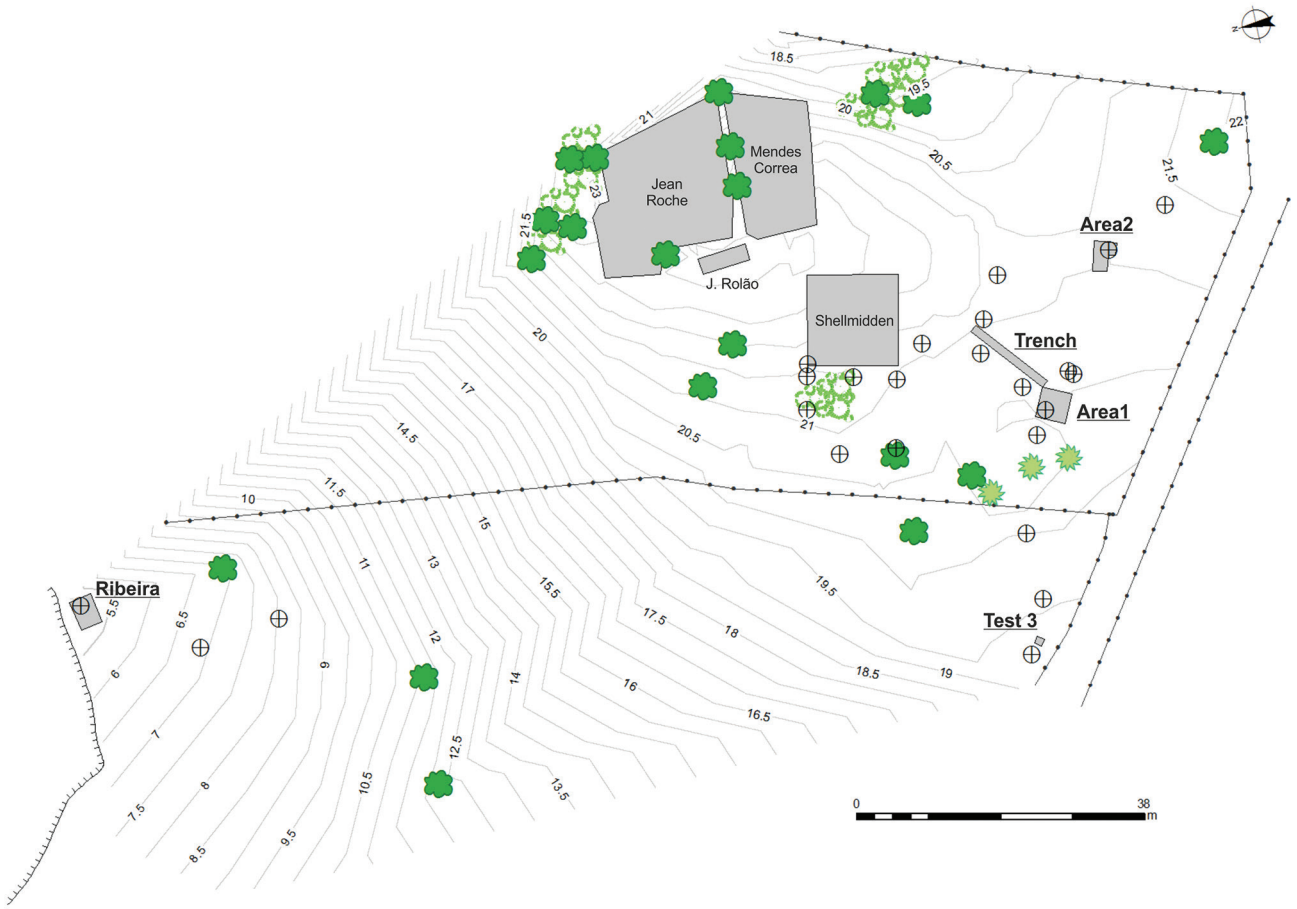

Fig. 24.1. Plan view of Cabeço da Amoreira with excavation areas mentioned in the text. Crossed circles mark the location of bore holes made with the manual auger.

We then discuss how these preliminary data improve our knowledge of the dynamics of site use before, during, and after the build-up of the shellmound.

The shellmound sequence

Cabeço da Amoreira is one of the largest middens in the Muge area (Gonçalves 2009; Bicho *et al.* 2011). The site is an artificial elliptical mound *c.* 90 m in length (N-S) and 50 m wide (E-W), with a stratigraphic sequence reaching the height of *c.* 3.5 m at its centre. The shell layers rest on the Pleistocene alluvial yellow sands, covering the edge of a terrace positioned *c.* 20 m above the present sea level. The eastern side of the midden was extensively excavated by A. Mendes Corrêa in the early 1930s and by J. Roche and O. da Veiga Ferreira in the 1960s (Cardoso and Rolão 2000). A smaller intervention was made in 2000 by J. Rolão (Roksandic *et al.* 2006; Rolão *et al.* 2006). Starting in 2008, our own on-going work has focused on the excavation of a large, 72 square metres main excavation area opened towards the southernmost summit of the artificial mound, the cleaning and sampling of profiles from old excavations, and on the excavation of several loci around the mound (Bicho *et al.* 2011). Based on these more recent investigations, the mound build-up can presently be divided into five general phases (Bicho *et al.* 2013).

Phase 1 – Initial shell-free occupation occurring on the top of alluvial sands and below the shell-rich layers, dated to *c.* 7900–7700 cal BP. Several features have been recorded, including pit and combustion structures, postholes, and human burials.

Phase 2 – Build-up of the shellmound, whose deposits are mostly composed of common cockle (*Cerastoderma edule*) and estuarine clams (*Scrobicularia plana*) species, but also of abundant quartzite pebbles, fire-cracked rocks, charcoal, lithic tools, crab legs, and bones. The greater part of these deposits consists of interfingering shell lenses that vary laterally in terms of their composition and thickness (Aldeias and Bicho 2016). These layers seem to have accumulated quite rapidly, between *c.* 7700 and 7600 cal BP.

Phase 3 – The second human funerary use of the topmost shell layer dating to *c.* 7500 cal BP.

Table 24.1. Ceramic materials from all non-midden areas of Cabeço da Amoreira.

Area	Layer	Minimum number of individuals
Area 1		
	1	24
	2	155
	2b	108
	3	11
Area 2		
	1	25
	2	6
Trench		
	11	1
	9	3
	8	5
	7	5
	6	17
	5	14
	4	18
	3	42
	2	20
	1	13
Test 3		
	(35–50 cm)	12
	(50–60 cm)	23
	(60–70 cm)	3
	(70–80 cm)	3
	(90–100 cm)	4
Ribeira		
	3	8
	4	17
	5	85
	6	208
	7	135
	8	1
TOTAL		1089

Phase 4 – Installation of a 10–30 cm thick cairn, made by the deposition of hundreds of thousands of small pebbles and fire-cracked rocks that seem to have covered the whole mound sometime between *c.* 7500 and 7300 cal BP (Cascalheira and Gonçalves 2012; Bicho *et al.* 2013).

Phase 5 – The final phase, after 7300 cal BP, when the cairn was cut in several places and at different times to deposit human bodies. This took place already during the Neolithic period.

Table 24.2. Lithic materials from Area 1.

	Layer 1	Layer 2	Layer 2B	Layer 3	TOTALS
Fragments	54	209	284	189	736
Chips	48	115	140	87	390
Flakes	9	27	32	45	113
Flake frag.	8	17	24	21	70
Blades	1		1	1	3
Blade frag.	2	7	3	5	17
Bladelets	5	10	20	14	49
Bladelet frag.	26	54	62	61	203
Crested pieces			1		1
Cores		7	12	13	32
Tools	3	8	9	5	25
TOTALS	156	454	588	441	1639

The non-midden occupations

Areas 1 and 2

The first two areas excavated outside the shellmound limits were Areas 1 and 2 (Fig. 24.1), located *c.* 10 m south of the mound limits. The stratigraphy in both areas is essentially similar (Fig. 24.2), marked by a sandy sequence that we were able to organize into four layers based on different colours, which resulted from various stages of pedogenic development.

Layer 1 – Maximum thickness of 15 cm. Presence of abundant roots and organic debris, corresponding to the superficial layer of grey-brownish colour.

Layer 2 – Maximum thickness of 55 cm. Presence of abundant roots, divided into two sub-layers: 2a – brown in colour with clay lamellae deposited in the lower part; 2b – reddish in colour with a poorly defined transition corresponding to a type B soil horizon.

Layer 3 – Maximum thickness of 45 cm. Yellowish-brown colour with abundant archaeological materials.

Layer 4 – Base of the excavated sequence of unknown thickness, marked by gravel-thick sands, probably of fluvial origin; archaeologically sterile.

Archaeological remains are spread throughout most of the sequence, most likely as the result of post-depositional processes (mostly root bioturbation), which were clearly evident during excavations. Notwithstanding, the identification of at least two discrete archaeological horizons was possible due to the patterns of presence/absence of ceramics and the typology of some of the lithic tools. While ceramic materials are dispersed through Layers 1, 2, and 3 (Table 24.1), Layer 3 is marked by the dominance

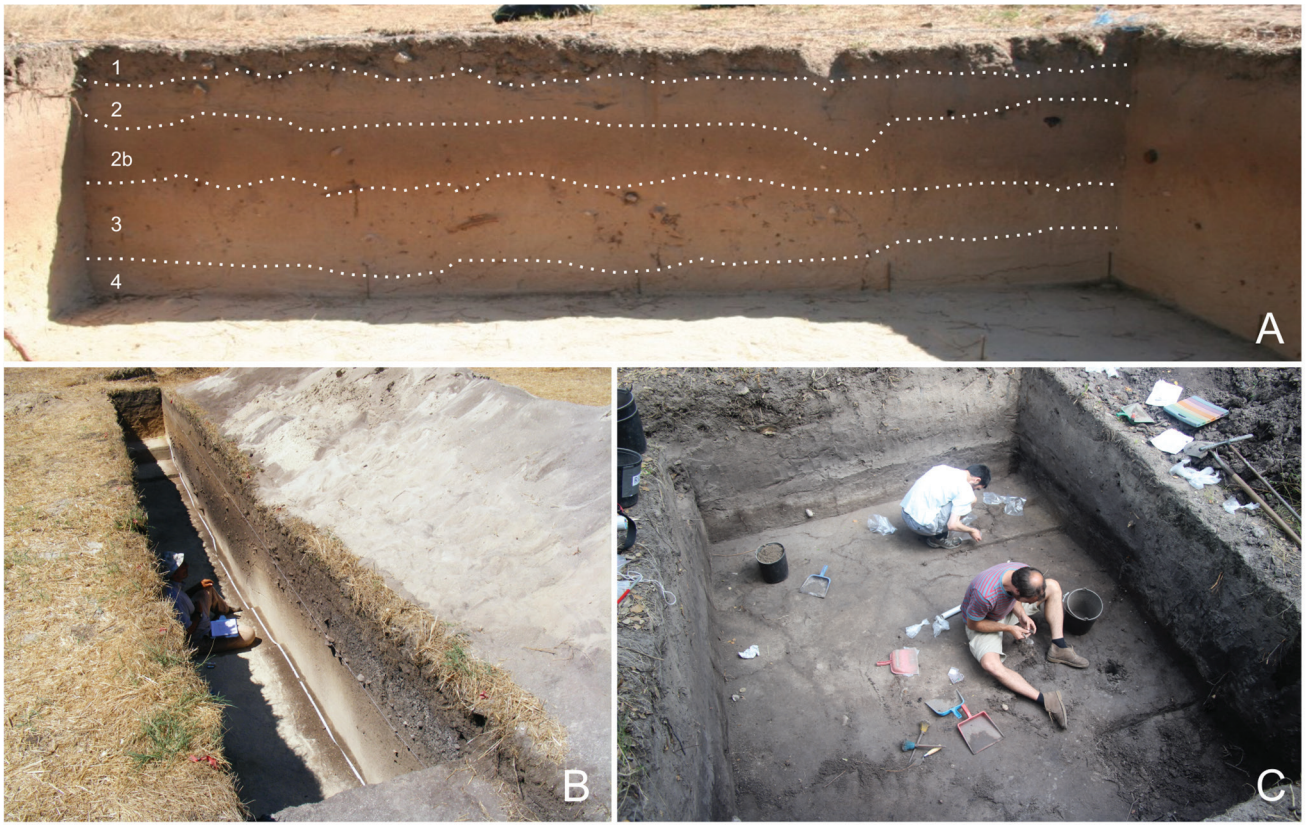

Fig. 24.2. The non-midden components of Cabeço da Amoreira. A: Stratigraphic sequence of Area 1; B: General view of the Trench area; C: General view of the Ribeira area.

of microlithic triangles (including the Muge subtype) and by the complete absence of segments, which in turn are present in the upper stratigraphic units. A preliminary analysis of the ceramic materials from the top layers revealed that at least two different Neolithic levels are present. One level contained fragments with Boquique decoration, suggesting a chronology between the regional Evolved Early Neolithic and Middle Neolithic. The other level contained a small fragment with Cardial imprints, possibly marking an Early Neolithic occupation of the site. Unfortunately, with the exception of some poorly preserved charcoal fragments, no other organic materials were found, and thus no absolute dates were obtained for this sequence.

The preliminary analysis of the lithic materials from Area 1 revealed a total of 1639 artefacts (Table 24.2), characterized by the predominance of quartzite and quartz pieces over chert and crystal quartz. However, this pattern is masked by the presence of a large number of quartzite and quartz fragments, most of them altered by fire, which if excluded make chert the most explored raw material. As attested by other areas of the site (Cascalheira *et al.* 2015) (see also description of the Trench area below), it seems that the exploitation of crystal quartz changed over time, with Layer 2 and sub-Layer 2b revealing more artefacts made of this raw material than in Layer 3. Retouched tools are residual (*c.* one percent), only made of chert, and are all microlithic geometrics, with the exception of a quartzite thick endscraper.

Trench

The identification of both Mesolithic and Neolithic shell-free horizons in Areas 1 and 2, at a small distance from the limits of the midden deposit, raised the question of the relationship between these horizons and the construction of the mound. To answer this, a 1 by 12 m trench was opened between the north-eastern corner of Area 1 and the southern limit of the midden (Figs. 24.1–2). In addition, along the shell midden edge, this trench made possible the identification of several Neolithic (Layers 7 and 9) and non-midden Mesolithic horizons (Layers 6 and 4), from which thousands of lithic finds and hundreds of potsherds were recovered. More importantly, we were able to observe that most of these layers were overlaying the shell midden; only one stratigraphic unit (Layer 4) represents a possibly interstratified occupation (Bicho *et al.* 2011; Cascalheira *et al.* 2015).

Table 24.3. Radiocarbon dates for the Ribeira area. Dates were calibrated using the IntCal13 curve (Reimer *et al.* 2013) in OxCal v.4.2.4 (Ramsey 2009).

Provenance	Lab ID	Material	Radiocarbon age BP	Calibrated range BP (95 % confidence)
Layer 3	Wk-42845	*Alnus*	2064±20	2115–1950
Layer 5	Wk-42846	*Erica arborea*	2777±20	2945–2875
Layer 6	Wk-42847	Ericaceae	4372±20	5030–4865
Layer 7	Wk-42848	*Erica arborea*	4376±20	5030–4865

Two partially dismantled combustion features were identified in this area. Both were formed by burnt quartzite pebbles organized into circular or semi-circular shapes with the presence of some poorly preserved charcoal fragments. These hearths were located at the intersection between Layer 4 and the top midden layer (in this case, of Mesolithic age and covered by the concentration of shells from the midden layers) and in Layer 7, which is of Neolithic age according to stratigraphically associated potsherds. At the base of the excavation, the upper levels of several rather large pit-like structures dug into the Pleistocene sands were also identified. These features are essentially similar to those reported by Bicho *et al.* (2011) for the Mendes Corrêa area in the eastern part of the mound, and attest to the fact that the initial occupation of the site was extensive.

Organic remains were mostly recovered from the midden layers. These include a set of personal adornments made of gastropod shells (*Theodoxus fluviatilis* and *Trivia arctica/monacha*) and a perforated cervid tooth (André and Bicho 2016). A preliminary analysis of the techno-typological traits of the lithic industries from the Trench suggested the presence of both diachronic and synchronic (probably functional) differences between the shell midden layers and the non-midden contiguous units (Cascalheira *et al.* 2015). Preliminary use-wear analysis on lithics has also been attempted, yet, with the exception of the recognition of diagnostic impact fractures in microlithic elements, the poor preservation conditions of the materials (both from midden and non-midden layers) provided limited results (Marreiros *et al.* 2015).

Test 3

While the Trench area allowed us to better understand the relationship between Areas 1 and 2 and the shell midden, a 1 by 1 m test pit (Test 3) was opened in a relatively flat, deforested area to the southwest of the mound (Fig. 24.1). This area was also tested with the geological auger, in order to assess the horizontal spread of archaeological levels found in Areas 1 and 2. The stratigraphic sequence is essentially similar to that described for Areas 1 and 2. After excavations reached one metre deep, the geological auger was used to drill down to the depth of *c.* 2.3 m. Only one archaeological horizon was recorded in the sequence, associated with sub-layer 2b, and thus it probably corresponds with one of the Neolithic horizons in Areas 1 and 2. Here, however, the context seems to be best preserved, with most of the materials packed in a *c.* 10 cm thick layer. The artefacts mainly consist of well-preserved ceramics (Table 24.1) with some fragments larger than five cm. Lithic finds are limited to flakes and mostly unworked quartzite pebbles. However, unlike the shell midden and Areas 1 and 2, fire-cracked rocks are very rare. Unfortunately, no datable materials were recovered from this test pit, and none of the ceramic finds had any kind of decoration that allowed an approximate dating of this archaeological horizon.

Ribeira

To the north of the shellmound, towards the alluvial plain of the Muge River, another excavation area was opened (Fig. 24.1). The main goal was to locate Mesolithic materials as close as possible to the old stream bed, not only because of the likely different function of that area within the Mesolithic settlement, but also because of a high probability that we would encounter excellent organic preservation within the marsh sediments. The initial work included a 1 by 2 m test pit that revealed two levels with archaeological remains after reaching a depth of 0.80 m. This test pit was, however, abandoned at a depth of *c.* 1.6 m due to a rise in groundwater and the impossibility of continuing excavations in such a small area. The area was thus enlarged to encompass a 3 by 4 m unit, the excavation of which ended up revealing a total of eight litho-stratigraphic units within the *c.* 2 m-deep sequence (Fig. 24.2). Layer 8 has only been identified in a restricted area by using the geological auger. All layers are composed of a sandy matrix, with very clear variations in the presence of clay and organic content.

Archaeological materials are present in all layers from 3 to 8. The sequence is dominated by a large number of ceramics (Table 24.1), charcoal, quartz, and quartzite pebbles, and to a lesser extent by quartzite flakes. A consistent feature of the ceramic materials from all strata of this area is its poor preservation. Fragments are generally of small dimensions, and most of them are just small nodules of only few millimetres in diameter. This situation is mostly

due to the sedimentary context that, given its location and direct contact with the river water in both the past and present, may have suffered from repeated alterations of both high heat and humidity. Even with these high fragmentation patterns, some of the potsherds retained enough form for an approximate cultural attribution, confirmed by a set of radiocarbon dates (Table 24.3) that revealed a timeframe beginning in the Late Neolithic/Copper Age (Layers 6 and 7) and ending in historical times (Layers 5 through 3). Since Layer 8 was identified through augering only, no organic material was recovered, and thus a chronological attribution is impossible at present. However, the presence of handmade ceramics within the auger contents reveals that at least one other prehistoric level (most probably Neolithic) is present within the unexcavated sequence.

Final remarks

Overall, the results from the non-midden components of Cabeço da Amoreira, and particularly their spatial and temporal relationship with the shellmound phases, are relevant for a number of current perspectives regarding the early Holocene human occupation of central Portugal.

Firstly, in addition to being virtually unique in the framework of Mesolithic shell middens in Portugal and in most of Europe, these contexts provide evidence for the existence of spaces with functionalities other than just a midden deposit in a single location. The internal organization of these sites is thus more complex than previously thought, and, consequently, we are still missing a great deal of information on their role within wider settlement systems. Contrary to some of the perspectives accepted until very recently (Rolão 1999), it seems clear that these are not single, isolated, residential sites. Although more detailed studies and perhaps larger assemblages are needed for a proper evaluation, some of the patterns revealed by the lithic assemblages from midden *vs.* non-midden contexts seem to suggest the existence of distinct activity areas. At this point, for example, differences are attested through the presence of more bladelets, microburins, and domestic tools, such as notches and denticulates in the non-midden layers than in the midden horizons of the Trench (Cascalheira *et al.* 2015; Paixão 2014).

Secondly, the new data also confirm the continuity of site use from the Mesolithic to the Neolithic, already confirmed by radiocarbon dates of some of the top-layer burials excavated in the shell midden. The confirmation of an Early Neolithic occupation at Cabeço da Amoreira implies a change in the current perspectives on the Mesolithic-Neolithic transition in central Portugal (Carvalho 2007; Zilhão 2000, 2001). This, in turn, relaunches the debate about cultural interactions and resilience of adaptive patterns between the two cultural systems and, with further work, will shed light on currently unknown fate of these Mesolithic populations (Jackes *et al.* 1997; Lubell and Jackes 1988; Lubell *et al.* 1994).

The collection of hundreds of lithics and ceramics and the identification of features such as hearths and pits from these rather small excavation areas in the non-midden loci guarantees the potential for future work. Moreover, in the Ribeira area, the stratigraphic conditions have exclusively high potential for the preservation of organic remains, including pollen and wood, in direct association with archaeological materials, similar to Star Carr (Conneller *et al.* 2009), Duvensee (Bokelmann 2012), and other coastal sites across Europe where Late Mesolithic and Early Neolithic paddles and boats were recovered. Further work will hopefully help in answering these and other unsettled questions of Mesolithic adaptations and the transition to the first farming communities in, westernmost regions of Europe.

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Foraging Assemblages is the publication of the proceedings of the Ninth International Conference on the Mesolithic in Europe, held in Belgrade in September 2015. The two volumes of these proceedings gather 121 contributions on Mesolithic research in Europe, covering almost every corner of the continent. The book presents a cross-section of recent Mesolithic research, with geographic foci ranging from the Mediterranean to Scandinavia, and from Ireland to Russia and Georgia. The papers in the volumes cover diverse topics and are grouped into 11 thematic sections, each with an introduction written by prominent Mesolithic experts. The reader will learn about changes in forager lifeways and the colonization of new territories at the end of the Ice Age and the beginning of the Holocene warming; the use of diverse landscapes and resources; climatic instabilities that influenced patterns of settlement and subsistence; the organization of settlements and dwelling spaces; the formation of regional identities expressed through various aspects of material culture and technologies of artefact production, use, and discard; aspects of social relations and mobility; symbolic, ritual, and mortuary practices; diverse ways in which Mesolithic communities of Europe were transformed into or superseded by Neolithic ways of being; and how we have researched, represented, and discussed the Mesolithic.

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