

Analysis of Burials from the New Excavations of the Sites Cabeço da Amoreira and Cabeço da Arruda (Muge, Portugal)

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ABSTRACT:

New excavations of the Mesolithic sites in the Muge valley directed by J.-M. Rolão, M. Roksandic and E. Cunha aim to provide finer details of spatial organization, site use and, eventually, social organization. Within that goal, microspatial analysis of individual burials is effected to further our understanding of mortuary and ancestral rituals and their incorporation into the habitation site. Cleaning and reinforcing the profiles at the sites of Cabeço da Amoreira and Cabeço da Arruda, and the first two campaigns of the new excavations resulted in discovery of the four burials presented here. In addition, new ¹⁴C dates and isotope data are given.

KEY WORDS

Mesolithic, Muge valley, mortuary archaeology, burial ritual

INTRODUCTION

New excavations at the site of Cabeço da Amoreira were begun in July 2001 by a team directed by Jose Manuel Rolão, Mirjana Roksandic and Eugenia Cunha with the goal of studying finer details of spatial organization, site use and burial ritual. In addition, we assessed the state of preservation of the site of Cabeço da Arruda. In 2000, in order to prepare the sites for excavation and to preserve them from further erosion and destruction by burrowing animals, the team started cleaning and reinforcing the profiles from previous excavations. We concentrated on the areas excavated by O. de Veiga Ferreira and Abbé J. Roche from 1952 to 1973 (Roche 1967; Roche 1989). I will examine here five burials that were uncovered during the cleaning and reinforcing of the profiles at both sites during the 2000 campaign (CAM-00-01^[1]; CA-00-01 and CA-00-02), and the two burials excavated with proper field procedures in 2001 (CAM-01-01 and CAM-01-02). For these burials we have obtained, in cooperation with M. Jackes and D. Lubell (University of Alberta), radiocarbon dates and dietary isotope values presented in this article. Since most of the previously

excavated burials from the sites of Arruda and Amoreira were uncovered in early excavations for which few records survive – Cabeço da Arruda (from 1863/64, 1880, 1884/5; 1933 and 1937) and Cabeço da Amoreira (1930-33) (Cardoso and Rolão 2003) – limiting our ability to assess the burial position to examination of a few hand sketches from field notes, the new findings will be briefly compared with the burials from Moita de Sebastião excavated and fully published by J. Roche and O. de Veiga Ferreira (e.g. Roche 1972).

BURIAL CAM-00-01 AT THE BOTTOM OF THE SEQUENCE IN CABEÇO DA AMOREIRA

In 2000, after an initial removal of the dense bush cover from the site of Cabeço da Amoreira, the eroded sediment was collected and sieved. During the cleaning stage, we realized that, after previous excavations, the archaeologists filled the area with yellow sand. Sand was a poor choice as retaining material, since by the time we started the excavations most of the western profile had already started to slide towards the bottom of the sondage. Once the eroded sediment and the yellow sand were removed, we reached the 'sterile' layer of the previous excavations, within which an undisturbed burial of a small child was uncovered. It was situated 2-5 cm below the unexcavated surface without any discernable burial pit (Figure 1a), and was designated as burial CAM-00-01 (Figure 1b). The skeleton was oriented West-East with the skull on

^[1]'CAM' stands for Cabeço da Amoreira, '00' stands for the year 2000, and '01' is the number of the burial uncovered that year. Each bone bears also a sequence number given during the excavations. Similarly, CA stands for Cabeço da Arruda. Each of the uncovered bones from the new excavations is marked with this notation.

the western side. The child was buried in a very constricted space, lying on the back, with the legs flexed either at the side or above the thorax and the feet at the level of the pelvis. The left condyle of the femur found among ribs indicates that the left leg was placed above the thorax with the left arm holding it in place (Figure 2b). The position of the left arm around the knee and the constraints it exercised on the rest of the leg explains the migration of the femoral head above the pelvis, or rather the sliding of the ilium underneath the femoral head. Since the right arm was not placed around the right leg, there was no constriction, so the femur, tibia and fibula migrated towards the side of the body early in the decomposition sequence, while all the bones still retained their appropriate anatomical position. That the space allocated to this burial was restricted is further indicated by the position of the cranium – visible by the superior aspect of the calotte, with the face tucked underneath – and by the fact that the splaying of the rib cage was limited by the position of the arms. All of this indicates that there was no architectural element, nor a pit larger than the body; in other words, there was no space in which the skull and ribs would naturally move. The position of the skull and the long bones indicates a very restricted shallow burial pit with immediate covering with sediment and progressive infilling (Duday 1985; Duday 1990; Roksandic 2002). The bones were coated in calcinations, thus no taphonomic changes on the surface could be observed.

We have obtained a ^{14}C date of 6630 ± 60 BP (Isotrace lab number TO-10218), giving us the calibrated date of 5640-5475 BC (with 95% confidence interval). Isotope value for $\delta^{13}\text{C}$ is -17.087. The $\delta^{15}\text{N}$ could not be obtained due to low collagen yield and diagenetic changes. The ^{14}C date seems too young for the burial at the very bottom of the stratigraphic sequence, and there is a strong possibility that this was caused by the same diagenetic changes (penetration of the bone by calcium) and low collagen yield.

BURIAL CA-00-01 IN THE UPPERMOST LAYER OF CABEÇO DA ARRUDA

During the same season, while prospecting the site of Cabeço da Arruda, we came upon a burial on the southern edge of the previous excavations on the surface level (Figure 2a). The original position of the deceased is difficult to discern, since a major part of the burial was destroyed by a rabbit hole, visible on the right of the burial in Figure 2a. The observations that could be made are, accordingly, very rudimentary. Preserved skull fragments, with maxilla

and mandible further down the slope (still in association), and a portion of the rib cage in the anatomical position, visible in Figure 2a, have an elevation difference of about 30 cm between them. The additional half of the mandible slid still further down towards the rabbit hole. Even though the preserved connections could – to an extent – indicate the original position, it is unlikely that the deceased was originally placed on the slope. The slope was most likely caused by post-depositional site formation (erosion) processes. After removing the loose cranial fragments, the exocranial surface of the left temporal became visible, while all other elements of the braincase had their endocranial surfaces exposed, indicating that the skull was possibly tilted to the right side. A small triangle was found in the fill of the cranium (indicated by an 'a' in the figure 2b). It is not certain whether the triangle was originally associated with the burial. The right humerus and scapula were in anatomical position, held by a piece of brechia, with the humerus perpendicular to the scapula (indicated by a letter 'b' in the figure 2b), its exothoracic and lateral aspects visible. Excessive disturbance, together with the scarcity of post thoracic elements – none of them *in situ* – does not allow for any further speculation about the original position. However, the burial itself is important as it gives us the chronological end for the use of the site as a burial ground. The ^{14}C date obtained is 6620 ± 60 (Isotrace lab number TO-10217), giving us the calibrated date of 5635-5475 BC (95% confidence interval). Thus, the end of the occupation of the site could be placed at the mid-6th millennium BC. Isotope values are -18.101 for $\delta^{13}\text{C}$ and 10.457 for $\delta^{15}\text{N}$, situated within the limits reported for Arruda and Moita by Lubell *et al.* (1994).

BURIAL CA-00-02 AT THE BOTTOM OF THE SEQUENCE AT CABEÇO DA ARRUDA

In the fall of 2000, heavy rainfall resulted in flooding of the whole area, causing the base of the Cabeço da Arruda site to be covered with water. While the team struggled to reinforce the cleared area of the profile, an undisturbed skeleton in the lower layers of the site was uncovered underneath a hearth. Unfortunately, the skeleton was already soaked in water and when we proceeded to excavate it in November, the rain was so heavy that any further delay in removing it would have been detrimental to the bones (Figure 3.). It was impossible to take any accurate drawings of the position of the body. While we attempted to remove the burial 'en-bloc,' the heavy rainfall made the sediment too loose to allow us to preserve the exact

position of the bones for future laboratory excavations. Accordingly, we have only several photos taken by Cunha and a superficial description of the burial. Field notes and the available photos reveal a primary burial, oriented West-East from skull fragments to pelvis. The body was lying on its back, with the arms alongside the thorax. Most of the bones were present, but in a very poor state of preservation. The left leg was extended while the right tibia was underneath the right femur, suggesting that leg could originally have been flexed at the knee. Full splaying of the ribs and spreading of the humeri sideways at the level of the elbows suggest a 'larger than the body' area in which decomposition took place. Even though there were no recognizable archaeological vestiges of a burial pit, or any construction surrounding the burial, the relative position of the bones indicates that the body decomposed within a delimited, but relatively large space. This could result from a large burial pit and some covering enabling the decomposition to take place before the sediment moved in. In addition, the burial was covered with a substantial amount of charcoal and a thick layer of crushed shell.

Charcoal from within the thoracic cage was taken for ^{14}C analysis. The ^{14}C date obtained from the charcoal (TO-10215) is 7410 ± 70 BP, giving a calibrated date (with 95% confidence intervals) of 6420-6155 BC. For comparison and consistency in dating with other burials, another date was obtained from a bone fragment. The ^{14}C date obtained from the bone collagen (TO-10216) is 7040 ± 60 , calibrated to 6015-5770 BC (95% c.i.). The charcoal date is much older than expected, indicating that the 'old wood effect' should be taken into consideration (Lubell, personal comm. 19/06/02). On the other hand, the chronological difference of 400 years between the TO-10216 (burial CA-00-02) at the bottom of the sequence and the TO-10217 (burial Ca-00-01) at the top is reasonable, given that the former is over 2m lower in the deposit than the latter. These dates are concordant with those obtained for the Moita de Sebastião sequence (Roche 1972:135-136) and with those reported by Cunha and Cardoso (2003). Isotope values for this bone fragment are -17.874 for $\delta^{13}\text{C}$ and 10.598 for $\delta^{15}\text{N}$, well within the limits reported for Arruda and Moita by Lubell *et al.* (1994).

BURIALS CAM-01-01 AND CAM-01-02 AT THE TOP OF THE SEQUENCE IN CABEÇO DA AMOREIRA

In July 2001, we began new excavations at the site of Cabeço da Amoreira in three 2x2 squares

(A1, A2, and A3) oriented on the south-north axes (Figure 4). These squares were excavated in artificial layers of five cm; all of the artifacts, bones, shells and rocks were recorded in detailed 1:5 plans of the excavation units. Soil samples from each designated unit were taken for palinological and paleoethnobotanical analyses (Wollstonecroft *et al.* 2004). In the course of excavations, a burial was uncovered in the south-east corner of the square A1. Since numerous skeletal elements were found in the eastern and the southern profile, and in order to access the whole burial, we extended the excavations into additional squares: **A1'** east of A1, **AA** south of A1, and **AA'** in the southeast corner. The general orientation of the burial is on the South-North axis. The field drawing reproduced here (Figure 5) and the analysis of the skeletal elements reveal the following:

The burial contains bones of at least four individuals:

1) the primary individual CAM-01-01 to which most of the bones belong;

2) a newborn baby in the quadrants A1-3 and A1-4 (northwestern corner of the burial), represented by the right hemi-neural arch of the lumbar vertebra, a metatarsal, a distal and a proximal end of a femur separated by 0.8m, a proximal left humerus, and a complete right tibia. These bones were designated as burial CAM-01-02 in the field laboratory.

3) at least one adult represented by a left navicular, a midshaft of a humerus, a fragment of a radius, three fragments of femur (two of which can be fitted together), and one additional femoral fragment with signs of excessive weathering not observed on any other bone from the assemblage.

4) one subadult individual represented by a fragment of scapula and a fragment of radius.

The main individual was uncovered between 20cm and 60 cm below the present day surface on a thick and compact layer of crushed shell. The bones were distributed over an area of approximately 2x2 m. The structure of most of the bones was well preserved, with no major diagenetic changes, no weathering and no calcinations. The bones themselves were mostly broken, and the skeleton heavily disturbed, which explains 40 cm difference in latitude between some bones. Several elements were still in anatomically correct positions, while others were spread over a substantial area. For example, refitting showed that the right tibia was spread over 1.3m on the East-West axis and 0.8m on the North-South axis, with elements of right heel – still in anatomical connection – and the rest of the foot spread over more than 1m. Similarly, the left heel is still in anatomical connection while

metatarsals and phalanges are spread over the western end of the burial. The disturbance is easily explained if we keep in mind that the burial is very close to the present day surface and that we had to remove a substantial number of small and medium sized roots of vines and other plants during excavations. In addition, the activity of small burrowing animals that often cause movement of smaller bone fragments was confirmed by traces of gnawing on one of the rib fragments. Nevertheless, a careful examination of those elements that retained their anatomical position (fragments of calotte, mandible, right humerus and thorax disturbed within the limits of the volume of the body, left femur and pelvis, left arm and hand, and left and right heel) enable us to discern the burial position.

While no burial pit was noted by changes in soil color, a tentative outline of the burial – indicated by a dotted line in Figure 5 – could be discerned on the basis of the skeletal elements distribution. For example, the upper body is well contained within its natural boundaries: the ribs, although heavily disturbed, remain within the limits of the thorax, while both left and right scapulae and clavicles retain their proper anatomical position. Given that only a few bone fragments were found beyond the right humerus, we could place the eastern limit of the burial beside the right arm. The left arm is flexed at the elbow and the left hand is lying beside the head. The left femur is still in an anatomically proper position with respect to a fragment of the left ilium, and even though the tibia and fibula were displaced, and the bones of the left foot – while not all in place – are consistent with the flexion of the knee towards the elbow. The western limit of the burial should be placed alongside these bones. Disturbed elements of the right foot – metatarsals and phalanges – placed some 20 cm further north from the left foot, could represent the northern edge of the burial even though the right heel, found some 50 cm further west – but in anatomical position – seem to counter this explanation. However, it is possible that the bones were moved ‘en bloc’ due to root or plough action. The position of a fragment of the right fibula (just above the left heel) and – as already mentioned – most of the right metatarsals confirm this interpretation.

The main individual was buried on its back with legs flexed towards the chest, either above the thorax, or on the left side of the body. There are no archaeological vestiges of a burial pit or any architectural construction. However, as discussed below, the flexed position of the legs could suggest either a deep pit, or a small mound.

None of the bones of the ‘extra individuals’ were found within the tentative limits of the original burial. The adult bones and the subadult radius (marked by a letter ‘E’ on the Figure 5) were found on the edges of the proposed burial outline, in an almost circular disposition, suggesting a possible disturbance of an earlier burial. The bones of the newborn were found northwest of the burial (the area of dispersal indicated by a broken line) and should be treated as a separate burial CAM-01-02, disturbed/destroyed by root and animal activity.

One ^{14}C date and several isotope values were obtained from the bone collagen. (Table 1.) The date (TO-10225) is 6550 ± 70 years, calibrated at 5620-5455 BC (95% c.i.). Values for both $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ for two rib fragments of CAM-01-01 (139 and 140, both from the main individual) are similar. Fragment CAM-01-01 (46) – a fragment of femur of an extra individual characterised by greater robusticity and unusual weathering – is similar for the $\delta^{13}\text{C}$, and substantially different for the $\delta^{15}\text{N}$. The latter falls outside of the range reported for either Mesolithic or Neolithic specimens and is close to the values for a terrestrial herbivore (Richards and Hedges 1999: figure 2.). While it appears to be human based on the morphological features, the fact that the fragment is relatively small raises the possibility that it actually belongs to a herbivore. Alternatively, the lab result could be wrong due to the already observed excessive weathering. (Table 1).

DISCUSSION

In terms of burial practices, the two burials from Cabeço da Amoreira that allow reconstruction of the burial position are concordant with the photographs from Moita de Sebastiao (Roche 1972) and field sketches from Amoreira and Arruda published by Cardoso and Rolão (2003). According to those, a number of adult individuals are buried laying on the back, with legs flexed at knee and drawn either towards the thorax or bent. It is interesting to note that the bent legs are often vertical and perpendicular to the rest of the body (see figures in Roche 1972), suggesting a substantial vertical space for the burial. CAM-01-01 could have been buried in the same position given the relative placement of the distal tibias and feet, while femurs collapsed into a horizontal state due to the disturbance of the uppermost layers of the site. This disposition presupposes substantial burial space (either a deep pit or a higher mound) with immediate infilling, or, alternatively, a restricted open space acting to prevent movement of long bones towards the ground. Covering of the body with sediment

immediately after disposal is more likely, since long bones tend to collapse within the burial even within a very restricted open space. The same burial position, exaggerated by a stronger flexion of knees above thorax – possible because of the greater flexibility of joints and ligaments in young children – is observed in the child burial CA-00-01. The child was disposed of in a very restricted space immediately covered with sediment. (Table 2).

The new dates and isotope information for all of the four individuals are presented in Table 2. Ranging between 6000 and 5400 cal. BC, the dates fall well within those already published for the Portuguese Late Mesolithic (Araujo 2003; Cunha and Cardoso 2003; Cunha and Umbelino 1998; Jackes and Meiklejohn in press; Lubell et al. 1994). If we take the average of each of the four dates at their face value, we could conclude that the beginning of burial activity at Cabeço da Arruda falls at 5910 BC, and the abandonment of the site with the last burial some 320 years later at 5590 BC. The site of Cabeço da Amoreira would have been occupied shortly after that, at 5585 BC, and abandoned at 5480 BC, only 105 years later. This, however, is unlikely, as these dates should be considered with their 95% confidence interval. In that case, the abandonment of both sites was synchronous, falling between 5635 and 5455 BC. The sites could have been occupied or used as burial grounds either simultaneously or intermittently during that period. The beginning of occupation for Cabeço da Arruda is placed some 300-400 years earlier between 6015 and 5770 BC. This chronological framework seems quite appropriate given the amount of accumulated sediment in the midden, more convincing than the overlapping dates for the top 5640-5475 BC and the bottom 5620-5455 BC of the sequence at Cabeço da Amoreira. As already noted, the bones of the child from the burial CAM-00-01 at the bottom of the sequence in Cabeço da Amoreira gave very low collagen yield, most probably due to diagenetic changes, and should be accepted with reservations.

The isotope data seem quite uniform – except for the already mentioned δN^{15} reading from a possibly intrusive bone in the CAM-01-01 burial – lying within the limits of the already published stable isotope data (Lubell et al. 1994). While δC^{13} cluster towards the lower range or below the values reported for Mesolithic sites (Jackes and Meiklejohn in press; Lubell et al. 1994), the δN^{15} value of 8.1 is clearly below the Mesolithic spread. According to Straus (1991), 8.1 for δN^{15} and -19 for δC^{13} represent a diet with no significant marine content. For Zilhão (1998), these values are markedly different from the

Mesolithic ones and typical of a Neolithic diet. The new data fit well with those already published showing increased trend towards more terrestrial diet with the passage of time (Jackes and Meiklejohn in press). In that light, the terrestrial diet of the individual at the very end of the occupation of Cabeço da Amoreira is less surprising. However, more data are needed for the whole series before any final picture can be drawn.

CONCLUSION

This paper is a preliminary report and its scope is limited to a description of burials discovered in the first three seasons of renewed excavations. They are presented without any further analysis of their contextual or comparative value. Nevertheless, the results show that more can be learned about mortuary ritual and burial practices if sufficient attention is paid to details of spatial distribution of skeletal elements within their archaeological context. The intention of these new excavations is to elucidate key features of mortuary ritual and help interpret the burial data from previous excavations in order to further our understanding of economic, social and ritual behavior at these sites. Only then we can hope to build a well balanced picture of life and death in the late Mesolithic of Portugal.

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Table 1. ^{14}C dates and isotope values for the 3 samples taken from the Cabeço da Amoreira burial CAM-01-01.

bone fragment	δC^{13}	δN^{15}	^{14}C cal (95.5% c.i.)
CAM-01-01(139)	-20.058	8.152	5620-5455
CAM-01-01(140)	-19.304		
CAM-01-01 (46)	-21.825	4.884	

Table 2. ^{14}C dates and isotope values for the four newly excavated individuals from the sites Cabeço da Arruda (CA) and Cabeço da Amoreira (CAM). Calibration by R.P. Beukens, Isotracer Lab.

site	δC^{13}	δN^{15}	^{14}C cal	^{14}C cal (95.5% c.i.)
CA-00-01	-18.101	10.457	5590 BC	5635-5475 BC
CA-00-02	-17.874	10.598	5910 BC	6015-5770 BC
CAM-00-01	-17.087		5585 BC	5640-5475 BC
CAM-01-01(139)	-20.058	8.152	5480 BC	5620-5455 BC



Figure 1a. The yellow sterile layer within which the burial was found. The dark and the sandy sediments are both intrusive and superficial from cleaning the profile at the side of the foot of the skeleton.

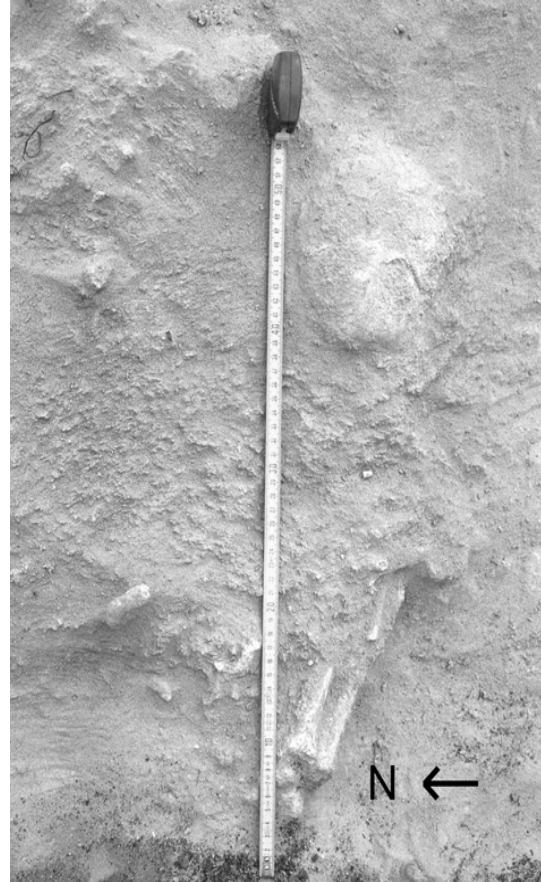


Figure 1b. The skeleton after cleaning, prior to removal of the bones. Note the metatarsals and foot phalanges in the pelvic region. Some metacarpals and hand phalanges are within the pelvis, while others are in the thorax

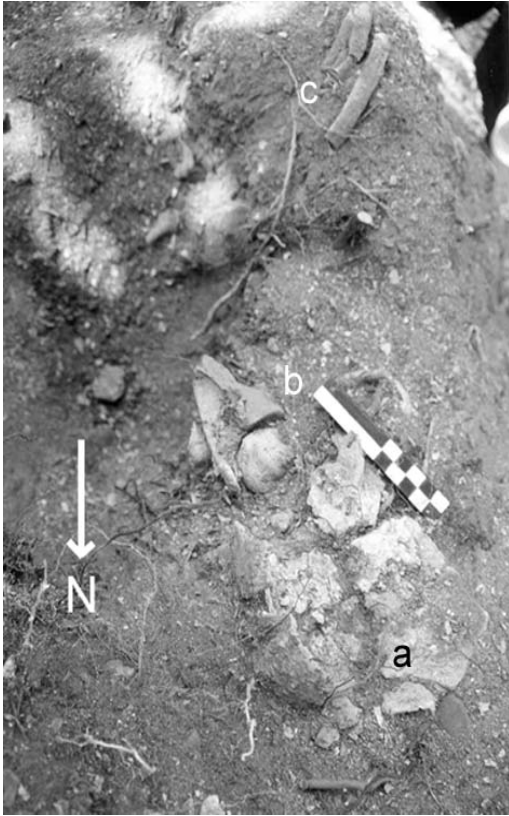


Figure 2a The skeleton CA0001 found during prospection. Note the rabbit hole on the right of the burial, and a steep slope.



Figure 2b The skeleton CA0001. An inverse view of the burial once the cranial fragments were removed. The rabbit hole is on the left of the picture. Note the scapula and humeral head in anatomical connection, and the small triangle at the very end of the parietal bone.



Figure 3. Burial CA0002. Note the excessive discoloration and fragmentation of the bones. Photo courtesy of E. Cunha.

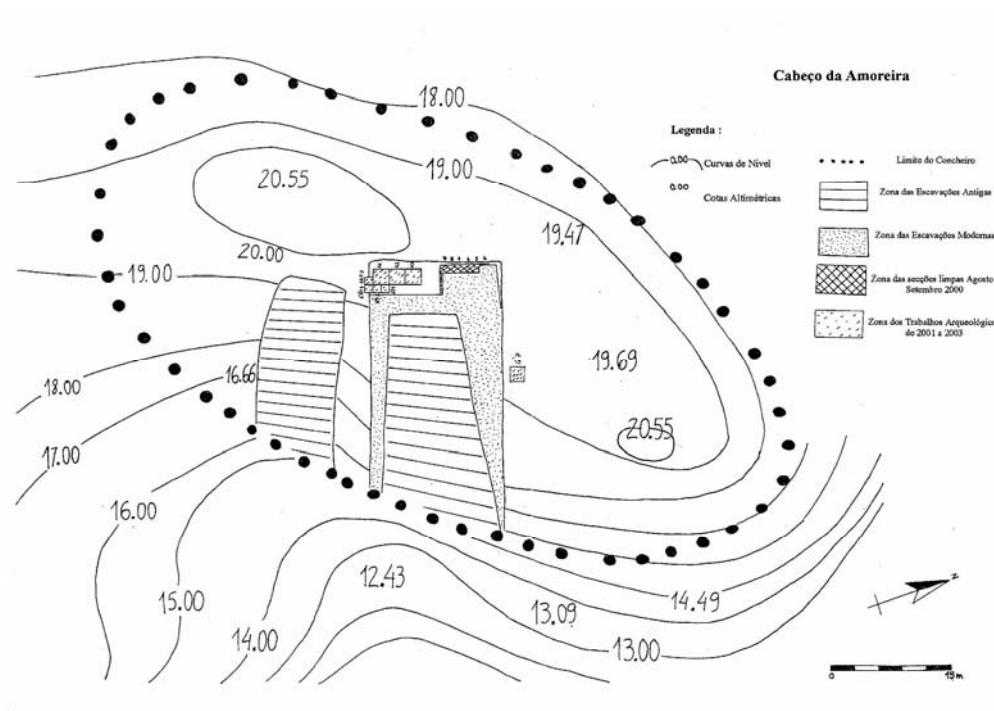


Figure 4. The map of the new excavation area at the site of Cabeço da Amoreira

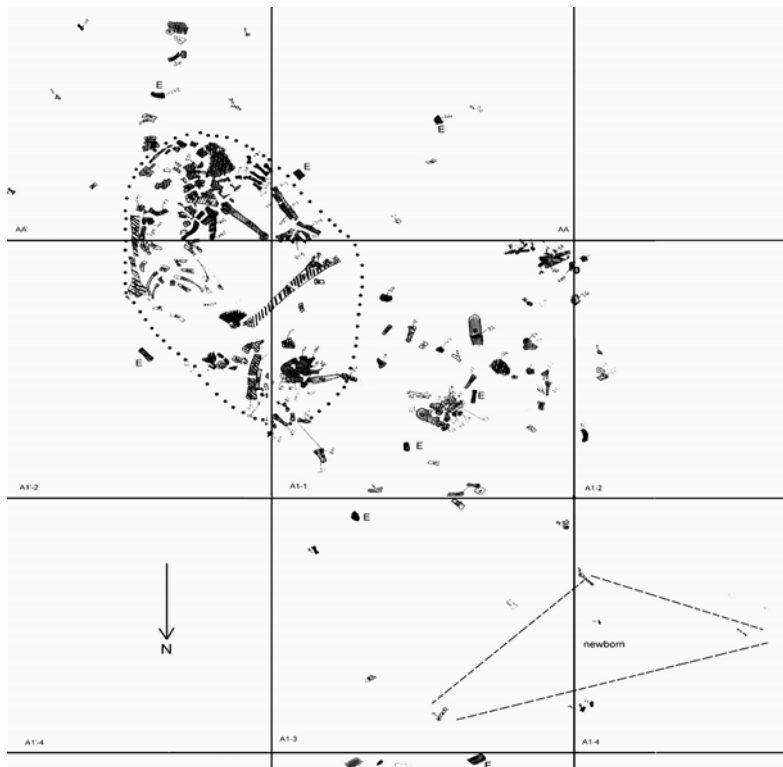


Figure 5. Burial CAM 01-01 in squares A1, AA and A1' excavated in 2001. Dotted line indicates the likely original outline of the burial. Broken line indicates the area in which the bones of a newborn, designated as burial CAM 01-02 were found. 'E' indicates bones of an additional adult and possibly a subadult.