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MESOLITHIC PEOPLE FROM PORTUGAL: AN APPROACH TO SADO OSTEOLOGICAL SERIES

ABSTRACT: *The paper deals with a first anthropological approach to an important Portuguese Mesolithic osteological series. It concerns the human skeletal remains exhumed from several shell middens of Sado River, south Portugal. From a total of 11 shell middens, 6 provided human skeletal remains. Three of these, namely, Arapouco, Amoreiras and Poças de S. Bento, are here analysed. In all, it is an assemblage of 53 individuals, approximately half of the whole osteological sample, dated from around 7,200 BP. Whenever possible, inhumation positions are presented, sexual distribution and age profile are given. Morphological aspects are discussed as well as the most relevant pathological cases. The value of this sample for the understanding of the Mesolithic way of life is undeniable, turning genuine the expectations about the palaeobiological results of the whole series.*

KEYWORDS: *Portuguese Mesolithic – Sado – Anthropological analysis – Skeletal remains*

INTRODUCTION

One of the key periods of human evolution, the Mesolithic-Neolithic transition, is particularly well illustrated in Portugal due to the large skeletal collections bracketing this period of time. A project on the palaeobiology of this period has been elaborated by the present authors whose purpose is, among others, to prove whether there is biological continuity or discontinuity across the Mesolithic-Neolithic transition.

The analysis performed in the present paper is restricted to the Mesolithic period from which two main skeletal series are known in Portugal: the one coming from the well known shell middens from Muge and a lesser known one, from the shell middens from Sado river. While the former was object of several researches and publications (Ferembach 1974, Frayer 1987, Lubell, Jackes 1988, Jackes *et al.* 1997, among others), the latter can be considered as virtually unknown. Therefore, we will limit this first anthropological approach to the Sado osteological series making references to Muge's series just in comparative terms. Muge's sample includes three main sites, namely

Cabeço das Amoreiras, Cabeço da Arruda and Moita do Sebastião from which approximately 300 skeletons were recovered. For Cabeço das Amoreiras, despite the fact that twenty-nine burials are reported since the time of their excavation performed several decades ago, only recently the skeletons' anthropological analysis has been done (Cunha, Cardoso 2002) and points to 21 individuals. In opposition, the majority of the human remains recovered from the other two sites have already been researched by several teams (Jackes *et al.* 1997).

GEOGRAPHICAL SETTING

The Sado shell middens, south of Lisbon, which are around 100 km south from Muge (*Figure 1*) are located on the lower course of the Sado, a small river about 175 km long, which is, among the rivers originating in Portugal, the one which offers the best navigability. Most of the shell middens are located on the edge of a very steep slope some 40–50 m above the river bed (Arnaud 1989).



FIGURE 1. Map of Portugal with Sado and Muge shell middens location.

As in Muge, the Sado shell middens are found within deposits containing occupation debris, almost always as primary individual interments (Jackes *et al.* 1997).

THE SADO SHELL MIDDENS

The Mesolithic shell middens of Sado have been known for at least 60 years. Compared to their famous counterparts of Muge, they did not attract much attention. Only 20 years after the first publication a major work of prospecting and excavation was initiated which corroborated its great importance and value. Nevertheless, this entire assemblage of sites remained unpublished, including a series of around one hundred skeletons. We had the chance to start its study in November 1997 in the National Museum of Archaeology in Lisbon, where the remains are housed.

Eleven sites, divided by three main areas, were reported along the ancient estuary of Sado river. From these, 6 sites contained human skeletal remains. According to the archaeologists (Arnaud 1989, 1993, Araújo 1999) the system was organised around two main temporary settlement-bases, Cabeço do Pez and Poças de S. Bento which were, simultaneously, the larger shell middens (*Table 1*). The remaining sites worked as seasonal settlements of lesser dimensions (*Table 1*).

CHRONOMETRIC FRAMEWORK

Several radiocarbon datings were performed. Arnaud (1989: 618) presents eight radiocarbon dates for some of the Sado shell middens which show that they were formed broadly during the same period as their Muge counterparts. Within our project, several radiocarbon dates on human bones were tried. The analyses were done at Beta Analytic and Instituto Tecnológico e Nuclear (Portugal). Four of the samples have not produced sufficient amounts of separable collagen for AMS analysis and could not be dated. The results obtained for the other sample (the first two are AMS dates while the last two are conventional ones), stated in the *Table 2*, are in accordance with the already existing dates.

Arapouco seems to be the oldest site, immediately followed by Cabeço das Amoreiras. On the other hand, the dates obtained for Cabeço do Pez suggest a slightly later occupation.

PALAEOBIOLOGICAL ANALYSIS

In all the 6 sites containing human remains, with the exception of Várzea da Mó where only one adult skeleton was retrieved, several individuals were found. Moreover, both sub-adult and adult individuals (*Table 3*), from both

TABLE 1. Sado shell middens with human skeletal remains.

Site	Area (m ²)	Excavated area (m ²)	MNI
Arapouco	1174	135	32
Amoreiras	1270	55	6
Romeiras	54	54	26
Cabeço do Pez	4000/8000	635	32–36
Poças de S. Bento	3570	60	15
Várzea da Mó			1
Total			112–116

TABLE 2. Radiocarbon dates of human bones from Sado shell middens.

Lab. ref.	Site	Skeleton Nr.	BP result	cal BC 2 σ	C13/C12
Beta-125109	Cabeço do Pez	4	6760 \pm 40	5680–5580	–22.6 ‰
Beta-125110	Cabeço das Amoreiras	5	7230 \pm 40	6145–5980	–20.8 ‰
Sac-1560	Arapouco	2 ^A	7200 \pm 130	6333–6330	–16.92 ‰
Sac- 1558	Cabeço do Pez	4	6740 \pm 110	5773–5438	–19.28 ‰

TABLE 3. Age at death distribution in Sado shell middens.

Shell Midden	Adults	Non-Adults	Total
Arapouco	26	6	32
Amoreiras	5	1	6
Romeiras	20	6	26
Cabeço do Pez	26	6	32–36
Poças de S. Bento	11	4	15
Várzea da Mó	1		1
Total	89	23	112–116

sexes, were recovered. This fact seems to preclude the hypothesis that there were selective areas for interments.

Although we have already analysed the whole sample, in the present paper we will focus on only three sites: Arapouco, Amoreiras and Poças de S. Bento, comprising an assemblage of 53 individuals which corresponds, approximately, to half of all the series (Cunha *et al.* 2000).

THE STATE OF PRESERVATION OF THE SKELETAL REMAINS

Before analysing the palaeodemography and palaeopathology of these individuals it is fundamental to give an idea of the state of preservation of the skeletal remains, which is directly related to the epoch and methodologies of their excavations. In effect, the great majority of the osteological material was recovered during the forties and the fifties, where, besides the very good field drawings, there is very little else to praise. A high proportion of skeletons is calcified. Moreover, for reasons of preservation, during the fifties they were paraffined. Consequently, the deposits, either of paraffin or the calcite, or both of them, strongly damaged the bones. Previous attempts to remove the paraffin and/or the calcite contributed to an even worse

state of preservation, since the skeletal material was fragmented. Therefore, in terms of the state of preservation of the human remains here analysed, there is an important variation.

There are skeletons completely preserved in blocks, allowing a correct evaluation of the inhumation position but precluding any observation of the osseous surface. In these cases, teeth were commonly found in occlusion (Figure 2), which inhibited the correct evaluation of the dental wear patterns and caries lesions, among others. On the other hand, there are, albeit in lower frequency, some skeletons with more or less complete bones where it was



FIGURE 2. Dentition in occlusion in a skeleton from Arapouco site.



FIGURE 3. Skeleton 7 from Arapouco, preserved as a block with paraffin.

possible to score metric and non-metric traits. In all, the variability of the state of preservation of the human remains makes it difficult to reach consistent frequencies for both pathologies or/and morphologies.

It is important to mention that the state of preservation varied from site to site. Specifically, in what concerns the sites here analysed, whereas the skeletons from Arapouco allowed the inference of various data due to the median state of preservation of their remains, for Poças de S. Bento, the skeletons are extremely incomplete. There are even some cases where only some long bone fragments were recovered. Therefore, demographic parameters such as sex and age at death were not achieved. In Amoreiras, the overall condition is intermediate between the two previous sites.

The Arapouco site

Although not more than 10% of all the area of Arapouco was excavated, it presents a high number of inhumations: 32 individuals were counted.

For this site no archaeological information about the fieldwork is available. Despite this, the existence of some paraffined skeletons allowed the reconstitution of the inhumation position (Figure 3). The majority of the individuals were buried in foetal position with the legs tightly banded with the arms, sometimes holding the lower limbs. The skull was laterally laid, being evident that some of them were crushed right after inhumation.

The interments are mostly single, with the exception of two cases (skeletons 9 and 10, 11 and 12) that represent the simultaneous burial of an adult, always female, and an infant. Other interments (skeleton 5) suggest a great temporal and chronological proximity.

This assemblage of 32 individuals contains 18.75% of non-adults (6/32), including 3 infants (less than 6 years old), a 9-year-old child and two adolescents (15 years \pm 36 months).

Concerning adult individuals, there is a slight male predominance of 53.8% (14/26). For sex diagnosis, whenever possible, the basis was the pelvic bone (Brůžek 1991, Ferembach *et al.* 1980, Krogman, Iscan 1986). Nevertheless, it was an assemblage of observations, namely on the skull, long bones and talus, which allowed the diagnosis (Figure 4).

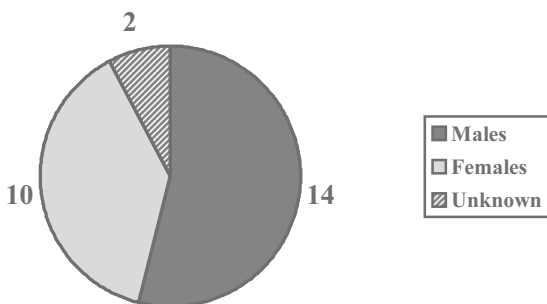


FIGURE 4. Adult sexual distribution for Arapouco site.

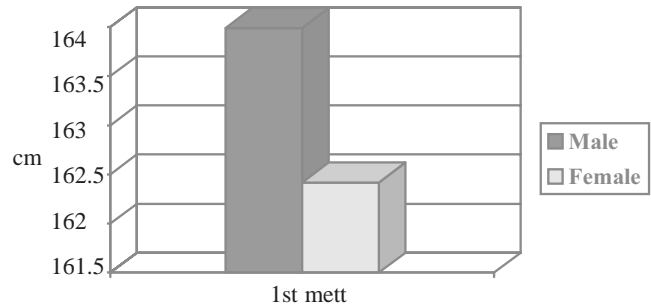


FIGURE 5. Arapouco stature based on the length of the first metatarsal bone.

For age at death estimation, the bone fragmentation only granted the inference of the lower age limit. As for sex diagnosis, it was also the conjunction of a series of skeletal indicators, such as suture closure, ante-mortem tooth loss, dental wear (mainly of the 3rd molars), osteoarthritis signs, degenerative metamorphosis both of the auricular surface and pubic symphysis, which gave the estimation. These techniques revealed two young adults (20–30 years old) and a reasonable percentage of individuals having died older than 40 years (23%, 6/26).

As far as morphological aspects are concerned, for Arapouco, among the 26 adults, stature was obtained for 62% (N=16). For 11 of them this morphological parameter was estimated by means of regression equations developed by Olivier *et al.* (1978) for long bones. For a group of 12 individuals stature was achieved by means of Byers *et al.* (1989) formulae based on metatarsals length (Figure 5).

We have analysed the maximum number of discrete traits possible. Among the various ones scored, we highlight the high incidence of wormian suture bones and septal aperture. For the former, in Arapouco, in the 8 individuals where these traits could be scored, 50% presented it. An equally high frequency was obtained for the latter one with 4 out of seven individuals with it.

Dental morphology was searched either by means of second molar measurements or by discrete traits, which were scored with the aid of dental casts. At the moment we do only present the metric of second molars (Figure 6) since they allow comparisons with other Portuguese series.

Concerning dental pathology, the number of dentitions in occlusion or covered by paraffin or calcite precluded an extensive study. Therefore, the question of interproximal caries, in particular, was unfortunately not correctly evaluated. Moreover, it is clear that the severe dental wear disguised the presence of caries. Furthermore, there are some cases where the root is the only portion left precluding an assessment of whether a severe dental wear or a caries lesion destroyed the tooth. In other words, for various reasons, the frequencies of caries are clearly underestimated. In terms of frequency of caries by individual, from the 15 adult individuals available for a correct analysis, 7 had at least one lesion. In all, 13 caries were observed, which means that many individuals had more than one lesion. Moreover, 7 of the total of caries (54%) were interproximal

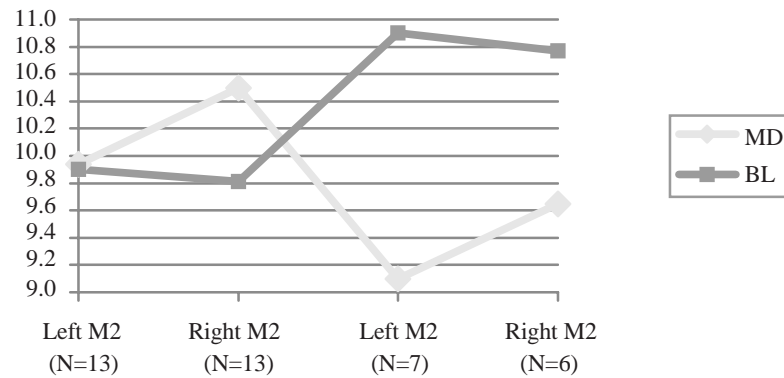


FIGURE 6. Mesiodistal and bucolingual diameters for the 2nd molar teeth.

ones. Because of the low number of individuals, it does not make sense to analyse caries by tooth.

On the other hand, dental wear does justify a more specific analysis. All the teeth were analysed using Smith's scale (1984). The mean values for each tooth can be seen in Figure 7. For Arapouco we can say that all adult individuals, with only one exception, show severe dental wear.

When dealing with pathologies perceived by means of bone analysis, it becomes obvious that there are not many cases to be detached.

Apart from a non-severe maxillary infection in an adult individual and a slight periosteal reaction in an adult tibia, there is not anything else relevant in terms of infectious disease. In contrast, there are 4 individuals showing traumatic injuries, which we will briefly describe.

A female who died older than 35 years (skeleton 3) shows three thoracic vertebrae with signs of compression, with loss of height on the middle portion of the vertebral bodies which become concave on their anterior part. There is also some periosteal reactive bone on vertebral bodies. The overall appearance suggests a kyphosis probably caused by a process of decalcification, eventually osteoporosis.

Another female individual, who died older than 40 (with at least 6 teeth lost ante-mortem) also shows some compression on her lower thoracic vertebrae and first lumbar ones. As well, there are clear concavities on these vertebral bodies. Besides, it shows osteoarthritic lesions.

The third case concerns a fracture on the distal portion of a 3rd metatarsal bone belonging to a female with the age at death over 40 years.

Finally, a male skeleton who had lost 13 teeth ante-mortem and with signs of osteoarthritis, shows a healed fracture and callus formation in the midshaft of the right fibula. Moreover, the same skeleton shows clear pathological signs on the spine from the 10th thoracic vertebra through the 3rd lumbar vertebra. Besides some kyphosis, x-ray analysis evidently shows destruction of the vertebral bodies, and formation of osteophytes on the anterior portions. Some ankylosis might have occurred on the articular processes. Several etiologies were proposed. Nevertheless, the differential diagnostic excluded tuberculosis, setting osteoporosis as the most probable cause (Umbelino *et al.* 1999).

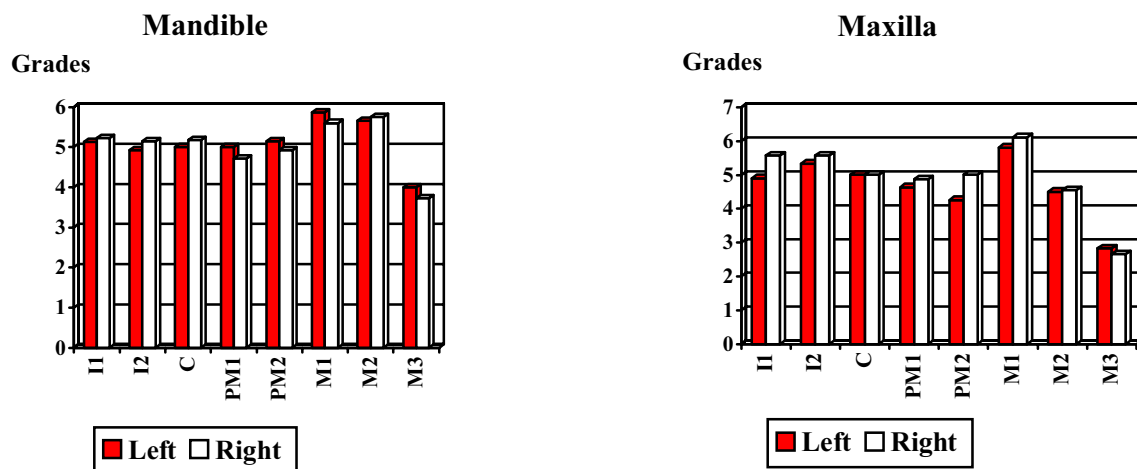


FIGURE 7. Arapouco dental wear following Smith's (1984) classification.

The Amoreiras site

The excavated area of the site of Amoreiras is one of the smallest from Sado. Only 55 m² were analysed. A detail of the main area excavated in 1958 can be seen in *Figure 8*, bearing evidence of the inhumation positions.

The skeletons were found in an apparently random disposition, but consistently oriented east-west (IV, VI, VII and VIII) or west-east (III and V). For each skeleton there are field drawings done by Mr. Dario de Sousa, one of them being reproduced here.

The 6 skeletons here exhumed correspond to 5 adults and one non-adult. Four of the adult skeletons are clearly masculine and middle-aged, including one with osteoarthritis signals. Three out of five individuals show caries lesions, including a case with 5 lesions and another with 4. Dental wear is strong, but less severe than in Arapouco.

These individuals were free from any other pathological evidence.

The S. Bento site

In S. Bento site, the skeletons found seem to be random in terms of disposition and orientation. Fifteen individuals were identified on the basis of very fragmentary and incomplete skeletal remains. Four were non-adult, including a foetus of 8–9 lunar months (Fazekas, Kósa 1978) and an infant who died before 2.5 years of age. The

remaining two sub-adults are an infant between 2 and 9 years of age, and an adolescent (12–15 years old). For the majority of adults we can only say that we are dealing with adult remains, without specifying either their age interval or sex. The incompleteness and the state of preservation of the skeletal remains precluded any rigorous pathological analysis.

FINAL AND PRELIMINARY COMMENTS

The osteological series from Sado valley are undoubtedly an essential piece for the understanding of the Mesolithic people from both the Iberian Peninsula and Europe. Moreover, these series can contribute to the solution of several key questions about the Mesolithic – Neolithic transition.

Concerning a comparison Muge – Sado, it is clear that there are both similarities and differences. Regarding funerary anthropology, in Sado, foetal position was the most frequent inhumation type, either fully contracted or in a semi-contracted posture, with bodies lying either on their left or on their right sides. This is not in accordance with Muge where the dorsal *decubitus* position was the most frequent type. Nevertheless, there is a certain parallelism between the two Mesolithic places (Muge and Sado). The disposition of the bodies varied from the



FIGURE 8. Detail of the main area excavated of Cabeço das Amoreiras site.

simultaneous burial in Romeiras to gradually placed burials during long periods of occupation in the other sites (several hundred years). Finally, in Sado there is evident proximity between the place of living and the place of burial.

As to palaeobiological aspects, similarities and differences are equally current. In the context of morphology, albeit the small size of the samples, the values found for stature in Sado are in accordance with the ones found for Muge. Jackes and Lubell (1995) have found a median male stature of 1.60 m whereas our correspondent values are 1.61 m.

Dental pathologies and dental wear seem to be the more relevant and informative observations done. Both in Muge and Sado, dental wear is severe and strong. Moreover, and particularly in Sado, the degree and pattern of dental wear in anterior teeth seems to indicate the use of this dentition in extra-masticatory functions. Plus, although posterior teeth were almost always extremely worn out, in some cases anterior teeth were even more severely affected. The posterior teeth dental wear is obviously in relation to the diet which certainly included abrasive items. Also the varying frequencies of caries lesions are clearly in relation to diet, namely the ingestion of sticky fruit.

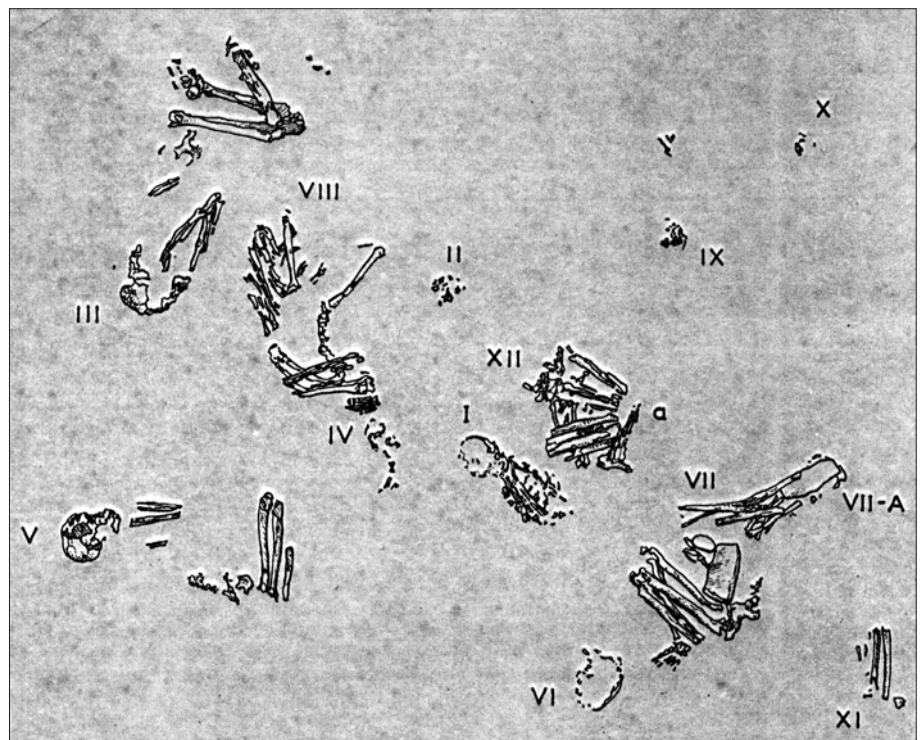
Nevertheless, this heterogeneous pattern in caries manifestation can be noted in both Sado and Muge.

Taking the pathological cases altogether, it seems that these series are characterised by a low incidence of pathological lesions. Considering that only chronic diseases can leave traces on the skeleton, it looks like the majority of these individuals have died mainly from acute diseases or fatal accidents. Any other kind of conclusions,



FIGURE 9. Field drawing of skeleton III made by Mr. Dario de Sousa.

FIGURE 10. General view of the burials in Poças de S. Bento site.



namely regarding the apparent low frequency of both traumatic and infectious diseases are, at the present state of work development, too premature.

In all, it seems that there is a lack of homogeneity inside the Mesolithic, which turns difficult the comparisons with the Neolithic populations. Moreover, it looks like a series of trends seem to have already started in the Mesolithic period. Nevertheless, the results here presented are just preliminary, which means that the prosecution of the present work will give a better idea of what was happening in Sado Valley some 7000 years BP.

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