ANTHROPOLOGICAL ANALYSIS OF A SKELETAL SAMPLE BELONGING TO THE SARMATIAN POPULATION INHABITING THE TERRITORY AT THE EAST OF THE PANNONIAN BASIN

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Abstract: The subject of this paper is the physical anthropological analysis of the osteological material discovered in the year 2010 in the sites B0_7-B0_8 during salvage excavations conducted on the future route of the highway section Arad-Timișoara. In most cases the taphonomic factors did not allow for the preservation of the skeleton, but teeth were present in a much better condition and therefore dental analysis was conducted in order to determine not only the age at death of the individuals but also to identify existing pathologies. Though the amount of information that could be drawn from the analysis was small due to the absence of the skeleton, the dentition provided data that can be useful both for the interpretation of the findings from the site, and for future analysis of other osteological materials assigned to the Sarmatian population.
Keywords: physical anthropology, dental anthropology, Sarmatian population, necropolis, 2nd-3rd centuries AD.

Introduction

Salvage excavations conducted in the year 2010 in the sites B0_7-B0_8, part of the Arad-Seceani section of the future highway Arad-Timișoara revealed the presence of 17 inhumation graves and another 17 complexes, the latter consisting mostly of storage pits, two trenches, two ovens, and two constructions representing most probably household enclosures. The spatial display of these complexes suggests that the excavated area is actually the South-Eastern part of a settlement which, based on the findings from the site, can be dated between the 3rd and 4th centuries AD and attributed to the Sarmatian population that inhabited the Pannonian Basin and its more Eastern territories during the 1st and 4th centuries AD[1].

The funerary assemblage is located in the Northern side of the excavated area, with two exceptions, graves 15 and 16, which were discovered near the South-Eastern limit of this area. The location of the majority of the graves allows for the limits of the necropolis to be established on its Southern and Northern sides, with further development to the East and West. The features of the graves like the rectangular-shaped pits and their North-

[1] BÂRCĂ *et alii* 2011, 192.

South orientation, together with the funerary inventory are characteristic for the Sarmatian population and date the funerary complexes between the end of the 2nd century and third quarter of the 3rd century AD[2].

Unfortunately, the specificity of the soil highly affected the osteological material, leading to the almost completely disappearance of the skeleton and preserving only a limited number of teeth. Moreover, insect activity can be seen on some of the bones, as in the case of the individual from grave no. 16[3] (Fig. 1).

Fig. 1. Insect activity (arrows) seen on the rib of the individual from grave no. 16.

Given this situation, the anthropological investigations were mostly limited to the dental analysis, which was carried on both the erupted and the unerupted dentition. The teeth were observed in order to identify carious lesions, developmental defects, molar wear, linear enamel hypoplasia, and dental calculus. When the mandible or maxillary were preserved, the presence of abscesses and alveolar remodelling due to antemortem tooth loss were noted. Most importantly, teeth were used in order to determine the age at death of the individuals, based either on tooth eruption (for non-adults) or molar wear (for adults). For all of these, we followed the guidelines described by Buikstra and Ubelaker in *Standards for Data Collection from Human Skeletal Remains* (1994)[4] and by Steckel and colleagues in *Data Collection Codebook* of the Global History of Health Project (2011)[5].

Table 1. Summary of the anthropological findings for the analysed sample.

Grave No.	Age (years)	Sex	Dental pathology	Skeletal pathology and trauma
1	25-35	M*	Carious lesions, abscesses, teeth lost antemortem	Porotic hyperostosis
2	3-4	IND*		
3	17-25	IND		
4	4-5	IND		
5	4-8	IND	Developmental defect	
6	2-3	IND		
7	4-5	IND	Dental wear	
8	6-9 months postpartum	IND		
9	unknown	IND		
10	12-15	IND	LEH*, carious lesion	Porotic hyperostosis
11	11-12	IND		
12	3-4	IND		
13	4-5	IND	Dental wear	
14	1.5-2	IND		
15	3-4	IND	Dental wear	Perimortem trauma
16	3-4	IND	Dental wear	
17	>15	IND		

*LEH - linear enamel hypoplasia. M - male. IND - indeterminate.

Fig. 2. Carious lesion on a molar belonging to the individual from grave no. 1.

Osteological description

The individual from grave no. 1 is poorly preserved. The morphology of the mastoid process and mental eminence suggests that the individual was a male, though this result has a limited probability. Age at death was inferred based on molar wear which points to a range between 25 and 35 years. The preservation of the mandible also allowed for the observation of several dental pathologies: four carious lesions (Fig. 2), two abscesses, and four teeth lost antemortem (Fig. 3). Enamel hypoplasia was not present on the canines and incisors. The existing cranial fragments showed porosity typical for porotic hyperostosis. Moreover, the left tibial shaft presented slight periostitic lesions.

Individual from grave no. 2 is represented only by three molars: Rdm^1, RM_1, LM_1[6]. These last two permanent molars were not erupted at the time of death. Although the roots of the teeth were affected by taphonomic processes and their surface greatly reduced, age at death was established

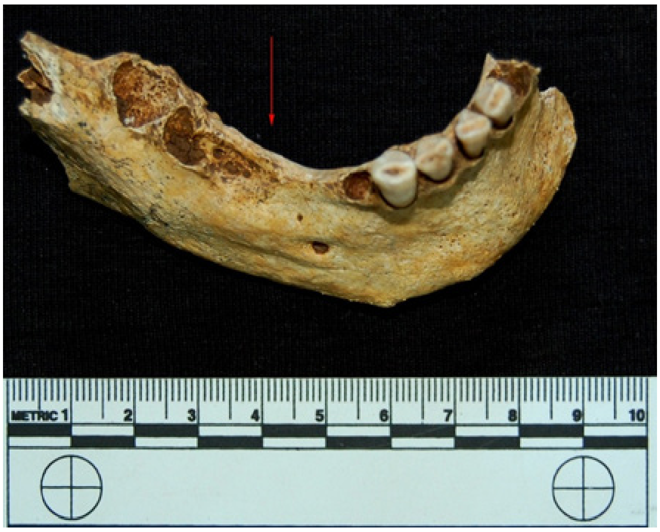

Fig. 3. Mandible belonging to the individual from grave no. 1, showing dental wear and antemortem tooth loss.

[2] BÂRCĂ *et alii* 2011, 192.
[3] BINDER *et alii* 2014, 8.
[4] BUIKSTRA/UBELAKER 1994.
[5] STECKEL *et alii* 2011.
[6] Throughout this paper we used the standardized model for listing the teeth (White *et alii*. 2012). Therefore, for example, LM_1 represents the left (L) permanent (capital letters) mandibular ($_1$) first (1) molar (M). Rdm^2 represents the right (R) deciduous (*d* and lower case letters) maxillary (^{2}) second (2) molar (m). When the sign *?* was used, the side of the tooth could not be established.

between 3 and 4 years.

Grave no. 3 preserved both osseous remains and 23 teeth, but the fragmentary state of the bones did not allow for sex to be determined. Molar wear is specific for the age interval of 17-25 years. No pathological findings were identified.

Individual from grave no. 4 preserves 10 teeth, both deciduous (Ldm_2) and permanent (LC_1, RC_1, RI^1, RM^1, RM_1, LM_1, RP_1, LP_1, $?P^1$). Not only were there no osseous fragments present for observation, but the enamel of the teeth was also affected by preservation conditions. The age at death was established between 4 and 5 years.

From grave no. 5, both osseous fragments (vertebrae, ribs, skull, humeri, femora, proximal tibia, ischium, illium) and teeth ($?I^1$ and another one unidentified) were recovered. Based on the development of the permanent incisor, the age-at-death was established between 4 and 8 years. The morphology of the unidentified tooth suggest it could be a deciduous molar or premolar, but its shape is highly flattened probably due to a developmental deficiency (Fig. 4). The lack of other teeth doesn't allow us to determine the cause of this defect.

Individual no. 6 is represented only by one tooth and few enamel fragments. The tooth was identified as RM_1. The root was not yet developed, thus pointing to an age at death of 2-3 years.

Grave no. 7 preserves osseous fragments but in a very poor condition which allowed us to identify only small pieces from the skull. These show no lesions suggestive of a possible pathology. There were also 22 teeth recovered, deciduous (Rdi_1, Ldi_1, Rdi_2, Ldi_2, Rdc_1, Ldc_1, Rdm_1, Ldm_1, Rdm_2, Rdi^1, Rdi^2, Ldi^1 ,Rdc^1, Ldc^1, Rdm^1, Ldm^1, Rdm^2, Ldm^2) and permanent, unerupted (LC^1, LI^1, RI^1, RP^1,). The age at death was established between 4 and 5 years. Dental wear was observed on the deciduous dentition, especially on the maxillary and mandibular incisors.

Fig. 4. Tooth belonging to the individual from grave no. 5 showing developmental defect.

Individual no. 8 is represented solely by deciduous teeth (Rdi^2, Ldi^2, Rdc^1, Ldc^1, $?dc_1$, Rdm^1, Ldm^1, Rdm_1, Ldm_1, Rdm_2). The development of the dentition suggests an age at death between 6 to 9 months postpartum.

Individual no. 9 preserves only small tooth fragments. Although, we identified a fragment from a molar, we could not establish which molar is it or if is permanent or deciduous, therefore the age at death remains unknown.

From the bones representing individual no. 10 we could identify fragments from the skull together with the mandible and maxillary, 27 teeth, and long bones diaphysis. One skull fragment shows lesions specific for porotic hyperostosis. The morphology of the nuchal crest suggests that the individual was a female, but unfortunately other diagnostic elements were not recovered, thus limiting the probability of this result. Age at death was determined based on the tooth eruption. The roots of RM^3 and RM_3 are poorly developed and M2 shows no wear, thus suggesting an age at death between 12 and 15 years. The right mandibular canine

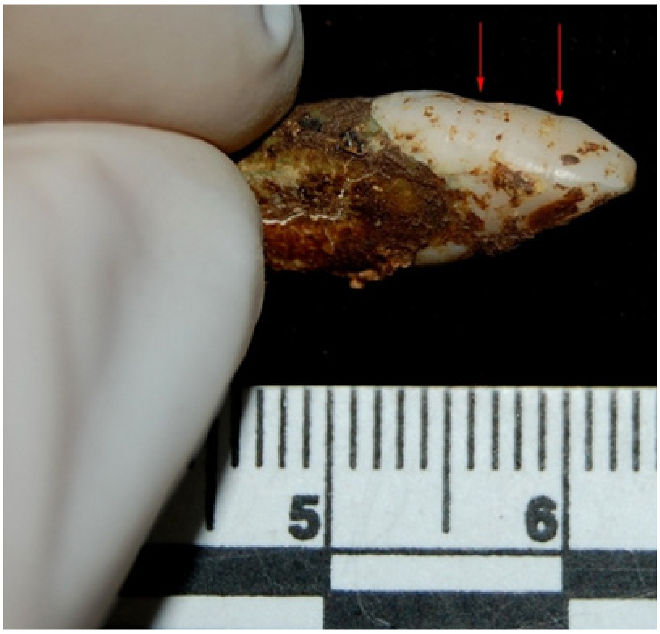

Fig. 5. Linear Enamel Hypoplasia (arrows) seen on the incisor belonging to the individual from grave no. 10.

shows hypoplasic lines on the enamel (Fig. 5). A carious lesion was observed on the LM_2.

Individual no. 11 preserves only permanent dentition, both erupted and unerupted (RI^2, LI^2, RI_2, RC^1, LC^1, RP_1, RP_2, LP_2, $?P^1$, RM_1, LM_1, LM_2, LM_3). Dental development suggests an age at death between 11 and 12 years.

From grave no. 12, both permanent and deciduous teeth were recovered (LI^2, LI^1, RI^1, RI^2, LM^1, LM_1, RM_1, Ldm_1, Rdm_1, Ldm_2, Rdm_2, Ldm^2, Rdm^2, ?c, ?i). Age at death was established between 3 and 4 years.

Both the recovered teeth and osseous fragments belonging to individual no. 13 are highly affected by taphonomic factors. Unerupted permanent (all the incisors, all the canines, four premolars, RM_1, LM_1, RM^1, LM^1) and deciduous teeth (all the incisors, Ldc^1, Rdc^1, Ldc_1, all the molars) were identified. Dental wear was present on the incisors. The age at death was established between 4 and 5 years.

Individual no.14 preserves $?M_1$, $?M^1$, and $?dm_2$, along with other fragments of enamel. The development of the permanent molars points to an age at death between 1.5 and 2 years.

From the teeth belonging to individual no. 15, we could identify permanent, unerupted teeth (RM^1, LM^1, LI^1, RI^1, LI^2, LI_2, LI_1, RI_1, RI_2, LM_1, RM_1) and deciduous dentition (Ldm^2, Ldm^1, Ldi^1, Rdc^1, Rdm^1, Rdm^2, Rdc_1, Rdi_1, Ldi_1, Ldc_1, Ldm_1, Ldm_2). Furthermore, small osseous fragments were preserved (ribs, phalanges, petrous pyramid). Based on tooth eruption, the age at death was established between 3 and 4 years. Dental wear was observed on the deciduous incisors and molars. On the visceral surface of the existing rib fragment we could identify two cuts produced probably perimortem (Fig. 6).

Individual no. 16 preserves osseous fragments (diaphyses, petrous pyramid), permanent unerupted (LM_1, RM^1, $?C^1$, $?I^1$, LI_1, RI_1) and deciduous dentition (Ldm^2, Ldm^1, Ldc^1, Ldi^2, Rdc^1, Rdm^1, Rdm^2, Rdm_1, Ldi_2, Ldc_1, Ldm_1, Ldm_2). Dental wear was seen on the incisors. The age at death was determined between 3 and 4 years.

Individual no. 17 is represented by very small osseous fragments and permanent dentition (?I_2, all the maxillary premolars, LC_1, RC_1, RM_1, LM_1, RM_2, LM_2). Dental wear is present on the molars, but in a mild form, without the dentine being exposed. This suggests an age at death over 15 years.

Fig. 6. (Probable) perimortem cut markrs on the visceral surface of a rib from the skeleton of the individual from grave no. 15.

Discussions

In bio-archaeological research scholars are dealing with the limitations specific for the archaeological record, like the underrepresentation of the individuals due to taphonomical factors, burial practices, and selective mortality, followed by further manipulation of the human remains during and post-excavation[7]. The cultural, social, demographical, and taphonomical factors lead to the formation of an archaeological assemblage, but can also be inferred from an extended and complex analysis[8]. In what regards the sample recovered from the sites B0_7-B0_8, the interpretation of the osteological findings is hindered both by the small number of individuals and lack of access to the human remains from the unexcavated areas of the necropolis, and by the uneven distribution of the sample in relation to the age at death.

The osteological analysis revealed the presence of several pathologies, both dental (linear enamel hypoplasia, carious lesions, abscesses, developmental defects) and osseous (porotic hyperostosis), along with other indicators of the various stressors experienced by members of this populational group (trauma, dental wear). Although the results of the analysis are limited by the specificity of the sample, a series of facts are worth to be discussed.

[7] PINHASI/BOURBOU 2008, 31-44.
[8] WEISS-KREJCI 2011, 69.

The age at death distribution of the osteological material is unusual in what regards the group of individuals with an age between 3 and 5 years (*n*=8) as compared to other age groups which are represented only by one or two individuals. This situation can be an outcome of burial practices or of the limited excavation of one particular area of the necropolis. Still, in the anthropological literature it has been shown that this age interval can be linked to the physiological stress produced by the weaning process (the introduction of solid food in the diet of the child)[9]. The transition from breast milk to solid food exposes the child both to nutritional deficiencies and to possible infectious diseases[10]. Bio-molecular and ethnographic studies have offered data regarding the weaning foods used by different communities and populational groups[11]. In many cases, this new diet did not supply the child's organism with the necessary nutrients needed in order to develop and mature, thus leading to various deficiencies. Decreased levels of certain substances like vitamin C, vitamin D or iron produce an osteological response (periostitis, macroporosity, *cribra orbitalia*, porotic hyperostosis) which is indicative for a range of conditions (e.g. scurvy, rickets, anaemia)[12]. Moreover, the environment associated with the process of eating could have been unsanitary and lead to potentially fatal infections and conditions like diarrhoeal disease[13].

The presence of linear enamel hypoplasia and lesions specific for porotic hyperostosis on two older individuals (12-15 and 25-35 years at the moment of death) suggests that these individuals have also undergone nutritional stress while they were younger but their immune system was strong enough in order to allow them to overcome those deficiencies and survive through later years and adulthood[14]. Individual no. 1, a male, also shows four carious lesions, four teeth lost antemortem, and two abscesses. In the bio-archaeological literature, the frequency and distribution of dental pathology along with dental wear have been used in order to infer subsistence patterns in regard to diet and

Table 2. Distribution of the pathological findings for each age group. The numbers from the table represent the number of individuals presenting the condition.

Age groups	No. individuals	Dental wear	LEH[1]	Porotichyp.	Carious lesions	Abscesses	Dev. def.[2]	Trauma
0-12 months post-partum	1							
1-2	1							
3-5	8	4						1
6-9	1						1	
10-15	2		1	1	1			
15-20	1							
20-25	1							
25-35	1			1	1	1		
Unknown	1							
Total	17	4	1	2	2	1	1	1

1LEH= linear enamel hypoplasia; 2Dev. def. = Developmental defect.

[9] PROWSE *et alii* 2008, 303-306.
[10] LEWIS 2007, 99-100.
[11] SCHURR 1998; PROWSE *et alii* 2008; BOURBOU/GARVIE-LOK 2009.
[12] LEWIS 2007, 119-131; WALKER *et alii* 2009; ARMELAGOS *et alii* 2014.
[13] LEWIS 2007, 100.
[14] LEWIS/ROBERTS 1997; WOOD *et alii* 1992; ARMELAGOS *et alii* 2009.

food-preparation techniques[15]. Usually, it is considered that dental caries are an effect of a diet with high carbohydrates and low protein levels, although mouth acidity and fluoride levels of the drinking water can also lead to the formation of caries[16]. This condition is therefore specific for agricultural populations with a diet containing mostly cereals. Still, dental pathology can also be secondary to another disease complex, like type II diabetes for example[17]. It is therefore hard to explain the pathological features present on the teeth of individual M1 without a comparative perspective drawn from the analysis of the skeletal material representing the other adult members of the community.

Conclusions

Although the taphonomical processes strongly affected the degree of representation of this skeletal sample, the preserved dentition allowed us to assess a series of aspects regarding the demographical profile and life quality levels for this populational group. The small number of individuals further limits the results as it was not possible to infer the presence of certain patterns in regard to demography and pathology. Nonetheless, the obtained information provides new data regarding the Sarmatian population inhabiting the geographical region at the East of the Tisa river in the 2nd and 3rd centuries AD. These results can be further correlated with other similar data from the same area and its vicinity, especially from the Roman provinces. This kind of comparative studies can provide insights into the subsistence strategies and lifeways present in different social systems and environmental areas. Therefore, even if a small skeletal sample does not offer ground breaking results, it is important that these archaeological populations to be analysed from a bio-archaeological point of view so as to produce a high amount of data which in the future can be researched in its entirety.

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