

BIOARCHAEOLOGICAL STUDY OF A SKELETON BELONGING TO THE SUPLACU GROUP, DATED IN THE MIDDLE NEOLITHIC PERIOD

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ABSTRACT: During the archaeological campaign of 2012 from the site of Suplacu de Barcău-“Corău”, one inhumated skeleton was discovered. The preliminary osteological analysis revealed that the skeleton belongs to an adult male. Moreover, the presence of certain pathological changes like osteolytic lesions on the calcanei, diffuse idiopathic skeletal hyperostosis, and other metabolic disorders argued for extending this analysis. In order to assess the etiology of these changes, their relationship to each other, and their consequences for this individual’s life, we conducted paleopathological, radiological and molecular analyses.

KEYWORDS: neolithic, human osteology, osteomyelitis, DISH.

REZUMAT: În timpul campaniei arheologice din anul 2012, derulată pe teritoriul sitului Suplacu de Barcău-“Corău”, un schelet înhumat a fost descoperit. În urma analizei osteologice preliminare a rezultat că e vorba de un bărbat cu o vârstă cuprinsă între 33 și 45 de ani. Prezența anumitor schimbări patologice cum ar fi osteoliza suprafeței posterioare a calcaneului drept, hiperostoza scheletică difuză idiopatică, și alte defecte metabolice, a argumentat extinderea acestei analize. Pentru stabilirea etiologiei acestor schimbări, precum și a relațiilor dintre acestea și a consecințelor avute asupra individului, au fost derulate analize paleopatologice, radiologice și moleculare.

CUVINTE-CHEIE: neolitic, osteologie umană, osteomielită, DISH.

INTRODUCTION

Bioarchaeological research operates with a populational perspective for the skeletal assemblages, aiming at the identification of certain patterns of biological variation. If correlated with the archaeological

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context, these inferred models can offer cultural and social information regarding the population group under study¹. Although it is a fairly new academic domain, bioarchaeology experienced a rapid development. With a basis in physical anthropology, bioarchaeological studies incorporated more and more methodologies from different scientific domains, resulting in the strong expansion of the level at which research is conducted². At the moment, this new approach uses methods and analyses from sciences like human anatomy and osteology, physics, chemistry, molecular biology, and genetics. Moreover, starting with the last decade of the 20th century, bioarchaeology has also developed its theoretical inquiry, which is proving to be so important these days³. Therefore, this new scientific area encompasses methodological aspects both from social and biological sphere, offering archaeology the possibility of knowing the individuals whose artefacts it has been studying for so long.

In the present paper we apply a bioarchaeological approach to the study of one skeleton discovered in the Neolithic settlement from Suplacu de Barcău-“Corău” during the archaeological excavations conducted in the year 2012. The osteological analysis of the skeletal material revealed the presence of certain pathological changes very interesting from a biological point of view. Here we describe these data with the purpose of integrating them in the larger context regarding the anthropological information known for skeletal material belonging to the Neolithic period from the territory of Romania.

MATERIAL AND METHODS



Fig. 1. Left maxillary canine with abscess and unusual wear.

The archaeological site of Suplacu de Barcău-“Corău” has been excavated since the year of 1973 by D. Ignat, and, in the last ten years, by G. Fazecaș. The focus of the archaeological excavations has been the settlement from this site, belonging to the Suplacu group, dated in the Middle Neolithic period. The archaeological campaign from the year of 2012 made use of geophysical methods, which led to the identification of 60 archaeological complexes, of which 53 were investigated. Among these, one inhumated skeleton (M1) was identified. Based on the stratigraphy of the site, this complex was dated at approximately 5000 BC. This discovery takes its place in the context of other funerary and non-funerary Neolithic complexes from Transylvania⁴.

For the osteological analysis we used well-known guidelines described in *Standards*⁵ and *Data Collection Codebook*⁶. Moreover, several methods from other articles were incorporated⁷. Sex determination was based on the morphology of the skull and pelvic bone⁸. Age was estimated based on the morphology of the pubic symphysis, auricular surface and sternal ends of the ribs⁹. Pathological changes were analysed following the descriptions made by Ortner¹⁰, Aufderheide and Rodriguez-Martin¹¹, Waldron¹², and Pinhasi and Mays¹³.

¹ Larsen 1997, 3; Larsen 2002, 120–121.

² Armelagos, Van Gerven 2003, 29; Buikstra 2006, 201–205.

³ Agarwal, Glencross 2011, 3.

⁴ Ignat 1998; Roșu, Gligor 2011; Gligor et al. 2012.

⁵ Buikstra, Ubelaker 1994.

⁶ Steckel et al. 2011.

⁷ White et al. 2012, 381–412; Lovell 1997, 140–141;

⁸ Bruzek 2002; Phenice 1969; Walker 2008.

⁹ Boldsen et al. 2002; Buckberry, Chamberlain 2002; Meindl et al. 1985; Ișcan et al. 1984.

¹⁰ Ortner 2003.

¹¹ Aufderheide, Rodriguez-Martin 1998.

¹² Waldron 2009.

¹³ Pinhasi, Mays 2008.

RESULTS

The very well preserved skeleton belongs to a male with an age at death of 33 to 45 years. The dentition lacks four teeth due to postmortem processes. From the 32 permanent erupted teeth, this individual has lost during his life eleven teeth. In what regards the dental pathology, we observed five abscesses and four carious lesions. Molar wear was moderate to severe (ranging from 4 to 8 according to the scoring guidelines provided in *Data Collection Codebook*¹⁴). Also, the left maxillary canine tooth showed an unusual wear on the lingual side, suggesting its possible use as a tool (Fig. 1). Linear enamel hypoplasia was either not present or could not be observed because the teeth were missing.

TABLE 1. Dental pathology.

Permanent erupted teeth	Teeth lost antemortem	Dental abscesses	Carious lesions	Molar wear	Unusual wear
32	11	5	4	Moderate to severe	Left maxillary canine

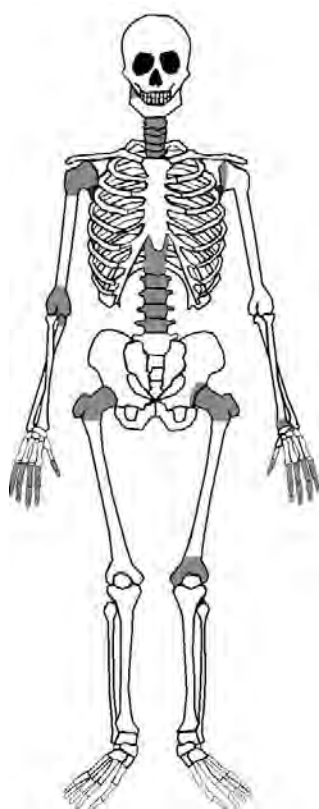


Fig. 2. Distribution of degenerative joint disease.

Furthermore, the skeleton was screened for several markers for occupational stress, nutritional deficiency and non-specific pathology.

Degenerative changes were identified on a high number of joints (Fig. 2.). For the upper limbs, the most affected side was the right one, with severe changes present on the humeral head (with eburnation) and the phalanges. As for the lower limbs, degenerative joint disease was identified on the left knee and on the pelvic girdle, affecting both the acetabulum and the femoral head.

All of the vertebral regions showed development of osteophytes of moderate dimensions. What's more, although the intervertebral space is not affected, the last two lumbar vertebrae together with the first sacral are fused by protruding bony bridges, specific for DISH (Diffuse Idiopathic Skeletal Hyperostosis). The position of the vertebral column would have been affected by this fusion¹⁵.

Porous lesions, specific for *cribra orbitalia*, were observed on the superior-lateral margin of the right orbital roof. Mild osteoperiostitis was present only on the shafts of the tibiae.

Four ribs, two from the right side and two from the left, displayed antemortem fractures. The poor state of preservation of the ribs did not allow us to assess the position of these ribs in the thoracic skeleton. The fractures are situated on the shaft of the ribs. Although the fractures were well-aligned, the process of healing resulted in the formation of bony callus around the point of injury.

The most interesting pathological changes present on this skeleton are bilateral lytic lesions on the calcanei. The lesions are situated on the calcaneal tuberosity, at the insertion point of the calcaneal tendon. The right calcaneus is by far more affected, with a lytic lesion measuring

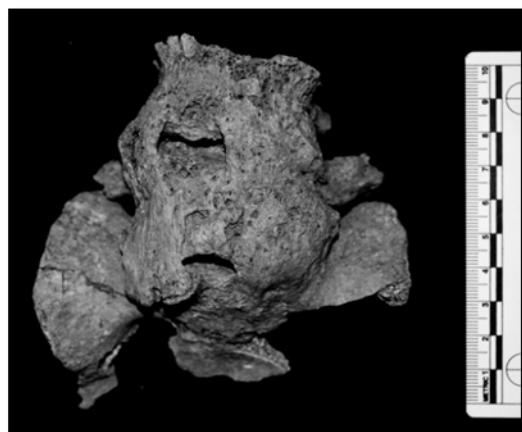


Fig. 3. DISH

¹⁴ Steckel et al. 2011, 18–19.

¹⁵ Waldron 2009, 73–77.

18.5 × 23.63 mm. Severe lipping and the formation of multiple exostoses around the edges of the lesion suggest that the foot has been used by this individual subsequent to the developing of infection. The morphological features indicate that the lesion was active when this individual died. The changes observed on the left calcaneus point to a similar condition but in a less advanced stage. The calcaneal tuberosity shows porosity and pitting, with four smaller cavities.

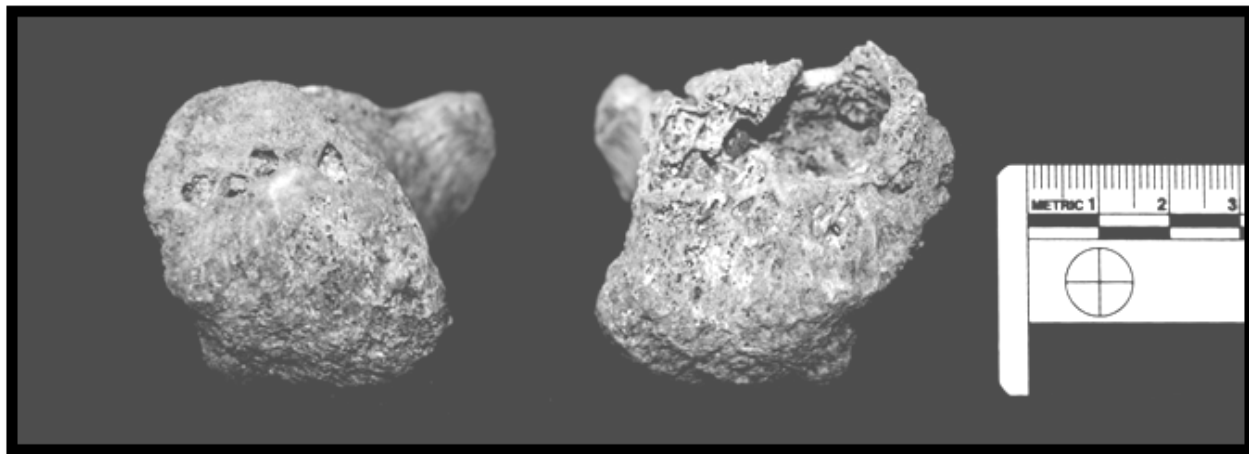


Fig. 4. The two calcanei

DISCUSSION

As described above, this adult male individual suffered from a series of pathological changes and trauma. In order to determine their etiology, multiple diagnostics were taken into consideration: osteomyelitis, tuberculosis, brucellosis and type II diabetes¹⁶. Our differential diagnostic had as a starting point the lesions from the calcanei, which suggest a chronic, prolonged infection. Together with the other known data regarding this individual, the lesions are highly suggestive of diabetic foot, a condition common in clinical patients suffering from Diabetes mellitus¹⁷. We hypothesize that the osteolytic changes seen on the right calcaneus are caused by osteomyelitis, which in turn would have been caused by chronic infection with *Staphylococcus* or *Streptococcus* species¹⁸. The initial superficial soft tissue infection to which this individual would have been exposed has evolved to a chronic, deep infection, with abscess formation and probably septic arthritis, the latter being a possible cause of death¹⁹. The underlying cause for this processes is diabetes, which reduces the host inflammatory response in case of injury or infection. Given the age at death of this individual (33–45 years), it is most likely that he suffered from late onset type II diabetes²⁰. This probability is also supported by the presence of DISH, which although it is an idiopathic disease, has been demonstrated in modern clinical studies to have a higher prevalence among diabetic patients²¹. Moreover, among the skeletal changes associated with diabetes mellitus, clinical studies list osteoarthritis, anemia, degenerative changes affecting the hands and the shoulders, and conditions affecting the muscles²². This individual exhibits all of these symptoms, with severe osteoarthritis of the phalanges and the humeral head, and calcification of the ligaments.

¹⁶ Ortner 2003, 179–227; Ortner 2008, 191–215.

¹⁷ Fierer et al. 1979, 215; Ledermann et al. 2002, 651–653; Jeffcoate, Lipsky 2004, 115–116; Ulbrecht et al. 2004, 74–77;

¹⁸ Ortner 2003, 181.

¹⁹ Williams et al. 2004, 84–86.

²⁰ Seino et al. 2010, 219.

²¹ Kim et al. 2001, 135.

²² Kim et al. 2001, 132.

CONCLUSIONS

Archaeological cases of diabetes are extremely rare²³. The oldest case dates back to ancient Egypt and the diagnostic relies solely on osteological evidence²⁴. We intend to further correlate our results with genetic and isotopic evidence in order to expand the differential diagnosis. In addition, ecological and environmental aspects will be taken into consideration in order to produce a detailed picture of the etiology of these pathological factors and to assess not only the life quality levels experienced by the individual but also the changes in behavior and subsistence that took place in the Neolithic period²⁵.

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²³ Reinhard et al. 2012.

²⁴ Dupras et al. 2010.

²⁵ Larson et al. 2007; Orton 2012.

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