ACADEMIA ROMÂNĂ

INSTITUTUL DE ARHEOLOGIE „VASILE PÂRVAN”

MATERIALE ŞI CERCETĂRI ARHEOLOGICE

SERIE NOUĂ
IX

2013

EDITURA ACADEMIEI ROMÂNE
BUCUREŞTI, 2013

Redactor Editura Academiei Române: ADRIAN MIRCEA DOBRE
Tehnoredactor Editura Academiei Române: DOINA STOIA

Revista se poate procura contracost la sediul EDITURII ACADEMIEI ROMÂNE, Calea 13 Septembrie nr. 13, sector 5, 050711, Bucureşti, România; tel. 4021-318 8146, 4021-318 8106, Fax 4021-318 2444, e-mail: edacad@ear.ro.

ORION PRESS IMPEX 2000 S.R.L., P.O. Box 77-19, sector 3, Bucureşti, România, Tel./Fax: 4021-610 6765, 4021-210 6787, Tel.: 0311 044 668, e-mail: office@orionpress.ro.

S.C. MANPRES DISTRIBUTION S.R.L., Piața Presei Libere, nr. 1, Corp B, Etaj 3, Cam. 301–302, sector 1, Bucureşti, România, tel./fax: (4021) 314 6339, e-mail: abonamente@manpres.ro, office@manpres.ro, www.romanianjournals.com.

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Meeting an Early Medieval Community: A Preliminary Analysis of the Human Skeletal Remains from the Jucu Cemetery (Cluj-Napoca, Romania)

ANNAMARIA DIANA*, MIHAI MEŞTER**

Keywords: rural settlement, Early Medieval Transylvania, Slavs, Migration period, cemetery, palaeopathology, physical anthropology.
Abstract: The cemetery of Jucu – "Tetarom III"- was excavated in 2007, part of a commercial archaeological project triggered by the construction of the Nokia industrial park. The investigated area proved to be extremely rich, the traces of human habitation covering a rather extensive time period, from the Early Prehistory (Neolithic) to the XVIII century AD. This paper presents the preliminary results of the osteological analyses carried out on 60 individual skeletons. The study suggested higher rates of mortality among juveniles, slight differences in the distribution of pathological lesions between females and males, and an average stature similar to that of other North-Central Early Medieval populations in Europe. The cemetery of Jucu was used during a time period characterised by intense population movements. Given the limited number of written documents pertaining to the early Middle Ages in Transylvania, archaeological and osteological evidence is vital to our understanding of this region's history. The present research constitutes only a pilot study but has provided extremely valuable information about the post-Roman community whose members were enterred at Jucu.

Cuvinte cheie: comunitate rurală, Transilvania, Evul Mediu timpuriu, slavi, migraţii, paleopatologie, antropologie.
Rezumat: Necropola de la Jucu (jud. Cluj) – „Tetarom III" – a fost cercetată în 2007 în urma săpăturilor arheologice de salvare determinate de necesitatea descărcării de sarcină arheologică a terenului pe care urma să fie amenajat parcul industrial Nokia. Zona este bogată în situri arheologice a căror datare merge din epoca neolitică până în secolul al XVIII-lea. Articolul de faţă prezintă rezultatele preliminare ale analizei antropologice efectuate pe 60 de schelete din această necropolă. S-a constatat astfel o rată ridicată a mortalităţii infantile, o slabă diferenţă între sexe în ceea ce priveşte patologia şi o talie medie apropiată de cea a altor populaţii europene din Evul Mediu timpuriu. Perioada în care necropola de la Jucu a fost folosită este caracterizată de intense migraţii. Numărul de surse scrise ce conţin informaţii referioare la această perioadă din istoria Transilvaniei fiind limitat, materialele arheologice şi osteologice reprezintă o sursă fundamentală în cunoaşterea istoriei acestei regiuni. Chiar şi într-o formă preliminară, studiul de faţă a permis obţinerea unor date preţioase asupra comunităţii de la Jucu.

INTRODUCTION

The Early Medieval period is considered all over Europe as the time when national identities first started to develop, and Romania is no exception (Murgescu 2001, 27). It is generally accepted that during the post-Roman period, the Transylvanian regions were continuously crossed by Avars, Slavs, Gepids and other tribes. These populations had different ethnic backgrounds (Borsody *et al*. 1980, 44) and fought one another for short-lived periods of regional control.

Another factor that needs to be taken into account is that Transylvania was even then one of the transitory regions between Western Europe and the Byzantine Empire.

Under the Christian influence, inhumation burials started to coexist with cremations, the former eventually replacing the latter (Slavic) custom. During this period of transition, in this region situated at the border of the Occidental Christian world, pagan beliefs coexisted with Christian values that had been only recently adopted by the local population (Gall 2005; Meier and Graham-Campbell 2007, 432).

There are two main questions that need answering:

- Who were the people living in the Carpathian basin before the Hungarian expansion?
- Did they preserve their cultural identity?

Although the present paper does not claim to offer comprehensive answers to these matters, the osteoarchaeological information collected herein will provide important elements for a better understanding of this critical period in history.

The aim of this study was twofold:

- to present the results of the osteoarchaeological analysis conducted between May and July 2011 on the human skeletal assemblage

* PhD candidate in Human Osteoarchaeology, Edinburgh University, School of History, Classics and Archaeology, e-mail A.Diana@sms.ed.ac.uk;

** Muzeul de Istorie, Gherla (Cluj-Napoca).

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recovered in 2007 in the village of Jucu, Cluj-Napoca, Romania and stored at the Museum of History of Gherla (Cluj-Napoca).

- to promote unknown aspects of Transylvanian archaeology and history, both to the local communities and to the foreign visitors and researchers. This constitutes an important goal for a small cultural centre such as Gherla and its surrounding communities, where curiosity about the distant and recent past has always been very strong (Meşter 2011).

THE SITE

In the spring of 2007, within the perimeter of the "Tetarom III" Industrial Park located at the periphery of the Jucu village, preliminary investigation aimed at preparing the area for the construction of a Nokia factory started.

According to the Romanian legislation protecting archaeological sites, excavations had to be carried out in order to identify, record and recover historical and archaeological information (Fig. 1). Following the survey undertook by a group of specialists (directed by Dr. Alexandru Diaconescu from the Department of Ancient History and Archaeology of the Babeş-Bolyai University in Cluj-Napoca) within an area of more than 160 ha, numerous archaeological sites dating from prehistory to the XVIII century AD were identified, and assigned to one of two categories:

1.Major sites (a Roman farm, the Autochtonous-Slavic settlement, the necropolis);

2.Secondary sites (a seasonal Neolithic settlement, a seasonal structure of the Coţofeni culture and a „hunter's house" dating to the XVIII century AD).

The Roman Farm (*Villa Rustica*)

This group of buildings occupied an area of 1.5 ha and was surrounded by a stone wall to which several structures were related. A total of seven structures were identified, one being the main household and the others related structures. On the south-east side of the courtyard a well was discovered and excavated.

The archaeological material unearthed consisted of agricultural and craft tools, nails for the wooden building elements, glass panel fragments, fibulae, a bronze decorative element, bone needles, glass beads, Roman provincial pottery, and harness elements. Another interesting finding is a golden pendant shaped through hammering into a crescent moon, probably a byzantine import dated to the VIII century AD. The harness garments and the tiles stamped "AIIP" may indicate the role played by this farm in building and developing the roads used by the military settlement of Gherla where a Pannonian cavalry unit was quartered.

The Slavic-Autochthonous settlement

This site with a total area of c. 0.70 ha was identified not far from the River Someş, at a distance of c. 2 km from the Roman farm. The excavation led to the discovery of shallow surface structures, but also of deeper structural remains at different depth levels. The archaeological material recovered included Romano-Slavic pottery (VII–IX century AD), iron tool fragments, burnt and semi-burnt timber, daub, fireplaces surrounded by stones with traces of firing, as well as storage pits. Pottery analyses, the identification of cemeteries with both inhumation and cremation burials, and the size and length of use of this settlement – approximately two centuries – suggest that it was a Romanian-Slavic community, similar to several others found throughout Transylvania.

The Romanian-Slavic cemetery

During the excavation of the *villa rustica* an inhumation burial was unearthed within the confines of this structure. Further investigation led to the identification of an inhumation-cremation cemetery with a perimeter of c. 0.50 ha, having as boundaries the central part of the Roman farm, the seasonal Coţofeni house, the Roman well, and the western side of the Romanian-Slavic settlement.

During the 2007 campaign, an estimated 25% of the cemetery was excavated, unearthing 88 inhumation burials and 13 cremation urns distributed among the inhumation burials (Fig.2). The initial interpretation of this burial site was that the individuals buried there had lived in the Romanian-Slavic settlement, given that the first burials were located within the Roman farm area which was later abandoned. Another important observation was that the inhumation burials belonged to local people who were Christians, whereas the funerary urns contained the remains of Slavic individuals (pagans) who co-existed peacefully with the autochthonous community in the aforementioned settlement.

With regards to the „secondary" sites identified in the same area – the seasonal Neolithic settlement, the seasonal structure of the Coţofeni culture and the "hunter's house" dating to the

XVIII century AD – these produced fragmentary and sometimes unidentifiable material which provides no significant information both archaeologically and historically.

THE ANTHROPOLOGICAL ANALYSES

During the excavation of the cemetery 88 burial numbers were assigned. Human remains were recovered from only 60 funerary contexts – 55 anatomically connected skeletons with varying degrees of preservation, and 5 identifiable isolated cranial and post-cranial elements (Table 1).

Methodology for the estimation of demographic features

All measurements were taken using a manual sliding calliper, a hand-made osteometric board and a tape measure. Manuals regularly used were White and Folkens (2010), Buikstra and Ubelaker (1994), Mays (2010), Van Beek (1983) and Hillson (1996, 2001).

For the estimation of sex in adults, multiple skeletal elements subject to dimorphic variability (i.e. shape of pelvic bones, skull features, and metric variation of post-cranial bones) were considered in order of reliability, and their results cross-referenced (guidelines by Buikstra and Ubelaker 1994; Mays 2010; White and Folkens 2005; methods by İşcan *et al.* 1984; Lovejoy *et al.* 1985; Brooks and Suchey 1990; Buckberry and Chamberlain 2002). A similar approach was used for the estimation of age (methods by Todd 1920; Phenice 1969; Brothwell 1989; Meindl *et al.* 1985 a, 1985b; Shaefer, Black and Scheuer 2009) and the identification of pathologies (as described in Aufderheide and Rodríguez-Martín 1998; Ortner 2003; Waldron 2009).

Determining features such as age at death and sex is vital to our understanding of past populations' mortality and morbidity patterns. It has been, correctly, asserted that "age determination is ultimately an art, not a precise science" (Maples 1989, 323).

In this work, the fact that the individuals whose remains have been subject of analysis lived in the Early Medieval period was taken into account. They probably worked from a very young age, and could have faced long periods of famine, epidemics, and the lack of proper medical treatment. These factors may have accelerated the process of degeneration of bones and teeth and comparison with standards based on modern skeletal assemblages is not ideal, but it is our only source. Table 2 shows the categories used to age the skeletons from Jucu.

RESULTS

It could be argued that 60 individuals out of an estimated total assemblage of 300 should not be used for palaeodemographic analysis, unless they represent a closed, coherent unit.

However, in most cases ancient cemeteries are not excavated completely, and quite often archaeologists have to deal with limited samples (Howell 1982; Milner *et al.* 1989; Woods *et al.* 1993; Chamberlain 2000). Inevitably, it is impossible to recover 100% of an ancient population's biological or cultural remains. Osteoarchaeologists invariably have to deal with partial data, but this does not imply that we should be silent witnesses of the osteological paradox. With the help of comparative studies, statistics and some cultural and archaeological understanding of ancient societies, it is possible to reconstruct certain aspects of the past. Ultimately, skeletal assemblages represent the living populations that produced them (Cohen 1994, 629).

Age and sex distribution

A plot of the skeletal assemblage by age classes was created for statistical purposes. Figure 4 shows the ratio between adults and juveniles, which is in favour of the juveniles.

However, at this stage it is probably better to consider that a combination of causes underlies the age distribution pattern, and that the numbers obtained reflect realistic information limited to the group of skeletons that were the object of this study. In addition, among adults, the female-male ratio should not be considered significant given the small sample (Fig. 5).

Metric and morphologic differences between the sexes

For the assessment of sex, both visual inspection of the dimorphic features and metric variation of the skeleton were considered (guidelines by Bass 1987). When looking at the measurements of maximum length, maximum diameter of the head and bicondylar width of the humerus, the main difference between men and women in the Jucu sample was length, with the shaft being almost two centimetres longer on average in men.

Bicondylar width was almost one centimetre larger in males, while the diameter of humeral head is very similar between the two sexes (Table 4).

Measurements of maximum head diameter and maximum midshaft circumference of right and left femora yielded similar results: the maximum diameter of the head is slightly bigger in males, while the shaft circumference is more than one centimetre larger in males (Table 5).

Another feature examined was bilateral asymmetry. In general, when both sides were present, the sizes were very similar, and not more than 5 mm difference between right and left side could be measured (Tables 4 and 5).

In addition, average height determined from the better preserved skeletons showed that male individuals from these samples were generally taller than females.

It is very important to underline here that, given the small size of this sample, measurements and their comparison could not be tested statistically, and they are therefore just presented in order to give a general metric overview.

Stature

The assessment of stature can be used to observe the correlation between nutritional status and height, and to compare populations from different geographical areas and chronological periods (Roberts and Manchester 2010, 41).

In this work the estimation of stature was attempted on adults when complete bones were found. The regression equation of Trotter and Gleser (1952), based on the measurement of the maximum length of long bones of skeletons from individuals of known stature killed in the Korean War, and adapted to different human groups by Bass (1987), was adopted. The equations were applied to the maximum length of right limb bones when available (otherwise to left limb bones). A bias has obviously been caused by the fact that the formulae were calculated on skeletal assemblages with a different ancestry than the skeletons from Jucu. Nevertheless, the calculations give an approximation of the median height of the individuals from this cemetery (Table 3).

Pathologies and trauma

A limited number of diseases leave traces on dry bones. Furthermore, many factors can affect the state of preservation of a skeleton, limiting the extent to which we can properly inspect the cortical bone or see the skeleton in its completeness. However, in spite of these limitations, the amount of information on pathological changes and traumatic injuries that bones can provide is considerable.

Within the Jucu assemblage, pathological changes were identified on the bones of twenty individuals, representing 36% of the sample analysed (Figs. 3, 6).

Infectious diseases: non-specific infections

As it can be seen in Fig. 6, periosteal inflammation (non-specific infectious disease) was found mostly on juvenile skeletons, and only one adult (M 51) showed a specific pattern of distribution of woven bone and periosteal reactions on the skull. Among the juveniles, one child (M $04_{(A)}$) and three infants (M $25_{(A)}$, M 28 and M 63) displayed new bone formation, mainly on femora and tibiae, as seen in other Medieval skeletal assemblages (Grauer 1993, 207) and indicating the spread of an infection to the bony level.

Metabolic diseases

Only one individual (M 26=32) displayed *cribra orbitalia***,** generally connected to anaemia, especially to iron deficiency anaemia (Angel 1966; Stuart-Macadam 1992).

Joint degenerative diseases

Unexpectedly, general changes of the contour and surface of joints could be located only on a limited number of adult skeletons.

M $23_{(A)}$ showed remodelled lesions (Schmorl's nodes) on a few thoracic vertebral bodies. However, most of the spine was either missing or had been heavily damaged post-mortem, making it difficult to assess whether the rest of the spine was also affected by similar lesions.

A better-preserved young adult male, skeleton M 24, displayed a similar pattern, i.e. the presence of Schmorl's nodes and marginal osteophytes on the bodies of thoracic vertebrae.

M 69 had a more severe form of Schmorl's nodes, gradually increasing in size from the last thoracic vertebra to the lumbar vertebrae.

M 60, an old male, was the most significant case of spinal degeneration from the skeletal assemblage, diagnosed as OA (osteoarthritis). In fact, despite the absence of eburnation, more than two of the changes that must be identified in order to allow the operational definition for osteoarthritis (Rogers *et al.* 1987, 185; Waldron 2009, 35) were present.

Three individuals were affected by spinal joint disease. The fact that they were all males might suggest the evidence for activity-related changes, as seen in other studies on Medieval British sites (Stirland and Waldron 1997; Coughlan and Holst 2001; Knüsel 2001).

Dental disease

Dental pathological lesions were recorded on the teeth of fifteen individuals (Fig. 7), representing >25% of the assemblage. Among adults, cavities were frequent, with seven adults (c. 20% of the individuals with dental pathology), displaying moderate to severe caries. One young and two mature adults displayed abscesses, probably caused by the presence of cavities on the nearest tooth. Nine individuals (26% of the assemblage, 60 % of the sample), all adults showed ante-mortem tooth loss (AMTL).

Calculus was found on the teeth of one mature and four young adults, while six adults (two young, four mature adults) displayed periodontal disease. In nine cases the same individual could be affected by more than one condition.

One sub-adult and one adult showed enamel hypoplasia (EH): M 62, had visible lines (two or more) on all teeth, excluding permanent molars (Fig. 8), while M 67, an individual with a very poor oral health, showed one line on the right upper canine.

Fractures and other injuries

Fractures are very interesting skeletal markers as their causative factors do not usually depend on the influence of external organisms such as bacteria and viruses, or diet and hygiene standards (Šlaus 2008, 459). They can give a picture of accidents in everyday life, and suggest the existence of inter-personal violence.

Within the Jucu skeletal assemblage, three adults (M 47, M 53 and M 54) had a bony callus on the left ulna, probably formed during the successful healing of indirect or direct traumatic injuries. One individual, M 60, displayed healed fractures on the ribs.

The occurrence of fractures on ulnae was noted in other studies of Medieval populations (Judd and Roberts 1998, 1999). The patterns of healing and positioning of those lesions can be linked to the so-called 'parry fractures' (Judd 2004, 2008), caused by accidental falls on the forearm or an attempt to protect the head from a direct blow. Some researchers see them as clear evidence of inter-personal violence (Jurmain 1999, 217), but a more cautious approach is adopted here.

M 47 displayed a bony callus on the left ulna, exhibiting some post-mortem superficial damage that exposed the underlying trabecular bone. The appearance was that of a properly healed fracture. Only the proximal epiphysis and less than the first third of the shaft of the radius were preserved, unfortunately not enough to determine if both bones were fractured.

The left ulna of M 53 also showed a thickening of the midshaft (Fig. 9). This bump displayed a twisted pattern, and its cortical surface had a slightly lighter colour than the surrounding cortical bone and also showed some micro-porosity. These elements suggest a healed spiral fracture (Lovell 1997). The fractures evident on M 47 and M 53 were well healed, indicating that the limbs affected were protected from movement during the recovery period.

M 54 was a poorly preserved skeleton, with most bones, including the left ulna, exposing trabecular bone. The fragment, identified as the left ulna by looking at the cross section of its D-shaped shaft, displayed an irregularly-shaped porous formation, suggesting that a complication had probably occurred during the remodelling phase of the healing of a fracture (Fig. 10).

The bones of M 60 (a male) bore the signs of a physically demanding life-style. In fact, apart from the aforementioned spinal stress indicators and very strong muscular attachments with several enthesophytes, bony calluses were identified on the ribs. This pattern of fracture can be the result of direct trauma, occupational stress or even persistent coughing and/or vomiting (Lovell 1997, 159).

Two traumatic skull injuries were also identified: M 72 showed on the left side of the occipital a healed depressed fracture of the cranial vault, roughly the shape and size of the top of a thumb, which could have been caused by a blunt trauma (Lovell 1997, 155). M 51, a female individual affected by a non-specific infectious disease, also displayed on her left frontal a circular compressed fracture showing the typical pattern of a blunt trauma injury with radiating and concentric fractures (Berryman and Haun 1996, 4) (Fig. 11). Unfortunately, it was not possible to determine what kinds of objects had caused these injuries of the skull.

DISCUSSION

Understanding how much the community of the dead is representative for the living society has always been a big challenge for the archaeologists. The disease load affects population growth and development, and thus the analysis of morbidity rates helps researchers to better understand modern and ancient societies (Roberts and Manchester 2010, 26).

According to palaeodemographic studies, in archaeological skeletal assemblages juveniles (infants mostly) are often under-represented, despite the fact that, given the high mortality rates of children during the past, we should expect to find a higher number of children (Aykroyd *et al.* 1999; Guy *et al.* 1997). In our case, more than half of the sample was represented by children and infants (Fig. 12). What does it mean? Various factors must be considered before attempting any hypothesis.

Firstly, all burials occurred quite close to the surface (60–70 cm below ground level) and most had been affected by the locals' agricultural activities and the excavation process. Both adult and juvenile graves had suffered similar amounts of damage owing to post-depositional factors.

Secondly, patterns of disposal of infants and children's bodies, in a community where Christian and Pagan traditions co-existed, may have resulted in better survival of juvenile remains.

Therefore, two main hypotheses may be proposed to explain the observed ratio of adults/sub-adults: 1) Mortality was higher in children than in adults; 2) The area of the cemetery excavated contained a higher proportion of juvenile burials.

With regard to the results of the pathological analyses, comparison of the incidence of disease within different age and sex categories reveals some interesting patterns. As shown in Fig. 6, morbidity rates were higher among young and mature adults. Some of the infants in the sample showed evidence of infectious diseases represented by the presence of woven bone. In pre-antibiotic societies, a simple cold or a small infection of soft tissues could cause a serious illness, and this is one of the reasons why many children died within the early years of life (Ortner 2003, 180).

One particularly interesting case is that of skeleton M 51, the only middle-aged female to show a severe infection at the level of the skull, a probable trauma on the frontal bone and dental diseases.

Among the children, some showed infectious diseases, but one only (M 26=32) displayed *cribra orbitalia*, together with osteolytic lesions on the femoral neck.

The dentitions of young and mature adults' were the most affected by disease. These two age classes were also the only representative ones for trauma. Old adults mainly showed AMTL and fractures. As seen in Fig. 8, all individuals affected by dental disease had caries. AMTL certainly was a consequence of the interaction of lesions such as caries, dental attrition and periodontal disease (Brothwell 1981, 154), the last mentioned especially being a major factor of tooth loss in ancient and modern populations (Roberts and Manchester 2010, 74). As also seen in some British cases (Roberts and Manchester 2010, 74), the rates of tooth loss are very similar to those of caries, and their presence increases with age. It is likely that many more individuals from the assemblage, perhaps all of them, had similar oral health problems but, unfortunately, not all the skeletons examined had a complete dentition, which can easily be damaged by post-depositional processes.

Furthermore, although it is difficult to estimate sex-specific frailty and life expectancy based on the data obtained from the analysis of such a limited sample, the analyses presented in Fig. 13 suggest a slightly higher incidence of morbidity among men. It is generally recognized that the nature of skeletal diseases is complicated by the different immune response of the sexes, owing to selective factors related to women's reproductive role as child bearers and the obvious sex-related physiological differences (Ortner 1998, 81; Roberts *et al.* 1998), which have determined the enhancement of female immune reactivity in the last 10,000 years as an adaptation of the female body to the risks of pregnancy (Roberts *et al.* 1998). In fact, if the developing countries are excluded (Roberts *et al.*1998, 81), in the majority of modern populations, women live longer than men, experience lower age-specific mortality rates, and appear to be more resistant to environmental stressors and diseases (DeWitte 2010, 285).

Among the skeletons from Jucu men and women displayed very similar incidences of dental disease, while joint diseases affected only men.

With regard to fractures and trauma, the most interesting finding is the occurrence of ulnar fractures, as the only other fractures identified were on the ribs of M 60. Unfortunately, it was not possible to observe a meaningful pattern of frequency

by sex given the small number of individuals, one male, one probable female, and one female. However, the location of these fractures on left ulnae is interesting, as the frequency of fractures of the forearm, and in particular the ulna, is often attested in Medieval (Judd and Roberts 1999; Djurić *et al.* 2006) and Egyptian (Alvrus 1999) rural sites. In clinical studies the absence or limited presence of displacement is usually interpreted as the consequence of a direct blow (Lovell 1997, 165). Furthermore, in rural communities such as the one from Jucu, daily chores and a more hazardous, dynamic life than in the city, exposed males and females to animal-related injuries, tasks involving repeated stressful actions, and accidental falls (Judd and Roberts, 1999). In British Medieval rural sites an even distribution of fractures between man and woman, although with some differences in types and locations, has been observed (Judd and Roberts, 1999).

Traumatic injuries were also located on cranial vaults of two individuals. If these lesions were peri-mortem as hypothesised, then this raises interesting questions about the life and death of the individuals affected (one young male and one middle-aged female). In fact, cranio-facial trauma is often cited as an indicator for warfare and interpersonal violence (Knüsel 2005; Facchini *et al.* 2008). However, identifying a specific aetiology would be pure speculation at this stage.

CONCLUSIONS

Considering that 80% of the cemetery is still unexcavated, the Jucu assemblage is the only human skeletal material on which to judge the characteristics of this early Medieval community.

The village of Jucu was located in a rural area, rich in water and natural sources. The material culture remains from the settlement and the grave goods have allowed archaeologists to date the site to the VII–X centuries AD. This period includes the so-called "South-East European Dark Ages" (Curta 2006, 70–110), characterised by political confusion following the withdrawal of the Romans, and subsequent raids by the Avars and the Slavs and, later, the Magyars.

Given the lack of literary sources and official documents for the time, archaeological and bio-archaeological studies are of vital importance.

The osteological data derived from the skeletal assemblage unearthed at Jucu shows high mortality among juveniles, followed by young and middle-aged adults, and a comparison of the two sexes shows morbidity to have been higher for men.

These results can be explained in two ways: 1) If the assemblage is considered as a representative sample of the whole community buried in the cemetery, then it can be stated that life-expectancy was very low, since mortality was very high among young individuals. 2) Alternatively, this can be treated as a tentative conclusion pending recovery and analysis of a much larger sample of skeletons from the cemetery.

Some remarks and questions arise at this point:

- Given the high rate of mortality between the fourth and fifth decade of life within the Jucu assemblage, adults aged >45 years were included in the older age class.
- The age/disease distribution pattern reflects a common situation in Early Medieval cemeteries, with more dental diseases and fractures among adults and infectious diseases among sub-adults.
- A higher number of mature/old adults suffering from joint diseases might have been expected: is this a sign of high status classes, of the existence of privileged groups? Or, could it be an indicator of occupation-specific diseases?
- Is the presence of traumatic injuries an indicator of inter-personal violence or warfare?

Given the low incidence of joint diseases, the presence of very common pathologies such as non-specific and dental diseases, the robustness of most individuals' bones and an average stature similar to that of other populations from the same period, the health status of this group of individuals can be assessed as "good", although life expectancy was rather low.

This picture is in line with other bioarchaeological studies of Medieval rural populations (Grauer 1993; Bennike et al. 2005; DeWitte 2010). In fact, it has often been noted that rural communities show evidence of a better quality of life than the inhabitants of cities, given the squalid conditions in most Medieval towns, caused by the lack of sanitation systems and overcrowding (Dunn 1972; Stuart-Macadam 1992, 43; Grauer 1993, 211; Sullivan 2005, 255). Unfortunately, little more can be said at this stage regarding the existence of privileged social classes or inter-personal violence.

This research was a pilot study. Osteological data were collected and interpreted, and have given a valuable insight into the life and death of a group of individuals from the cemetery of Jucu. A more

coherent view of the community should be possible if other parts of the cemetery are excavated.

ACKNOWLEDGEMENTS

We would like to thank Professor Clive Bonsall and Dr. Adina Boroneanț for their useful comments on the previous drafts of this paper.

BIBLIOGRAPHY

Alvrus 1999 – A. Alvrus, *Fracture patterns among the Nubians of Semna South, Sudanese Nubia*. International Journal of Osteoarchaeology 9, 1999, p. 417–429.

Angel 1996 – J. Angel, *Porotic hyperostosis, anemias, malarias and the marshes in Prehistoric Eastern Mediterranean*. Science 153, 1996, p. 760–763.

Aykroyd *et al.* 1999 – R.G. Aykroyd, D. Lucy, A.M. Pollard, and C. Roberts, *Nasty, brutish, but not necessarily short: a reconsideration of the statistical methods used to calculate age at death from adult human skeletal and dental indicators*. American Antiquity 64 (1), 1999, p. 55–70.

Aufderheide *et al.* 1998 – A.C. Aufderheide and C. Rodríguez-Martín (eds), *The Cambridge Encyclopaedia of Human Palaeopathology*, Cambridge, 1998.

Baetsen 1998 – S. Baetsen, *Het Menselijke Skeletmateriaal van het Salvatorplein te Susteren*. Intern Verslag Archaeozoölogie, Amersfoort, 1998.

Bass 1987 – W.M. Bass, *Human Osteology: a field guide and manual*, Missouri, 1987.

Bennike *et al.* 2005 – P. Bennike, M.E. Lewis, H. Schutkowski, and F. Valentin, *Comparison of Child Morbidity in Two Contrasting Medieval Cemeteries from Denmark*, AJPA., 128, 2005, p. 734–746.

Berryman and Jones Haun 1996 – H.E. Berryman and S. Jones Haun, *Applying forensic techniques to interpret cranial fracture patterns in an archaeological specimen*, International Journal of Osteoarchaeology 6, 1996, p. 2–9.

Borsody *et al.* 1980 – S. Borsody, N. Dreisziger, A. Makkai, G. Schöpflin, *Transylvania and the theory of Daco-Roman-Rumanian Continuity.* Committee of Transylvania, INC, 1980.

Brooks and Suchey 1990 – S. Brooks and J.M. Suchey, *Skeletal age determination based on the os pubis: A comparison of the Acsádi and Nemeskéri and Suchey-Brooks methods*, Human Evolution 5, 1990, p. 227–238.

Brothwell 1981 – D. Brothwell, *Digging up bones*, London, 1981.

Brothwell 1989 – D. Brothwell, *The relationship of tooth wear to aging*, in M.Y. İşcan (ed.), *Age Markers in the Human Skeleton*, Springfield, Illinois, 1989, p. 306–316.

Buckberry and Chamberlain 2002 – J.L. Buckberry and A.T. Chamberlain, *Age Estimation from the Auricular Surface of the Ilium: a Revised Method*, AJPA., 119, 2002, p. 231–239.

Buikstra and Ubelaker 1994 – J.E. Buikstra and D.H. Ubelaker, *Standards for Data Collection from Human Skeletal Remains*, Fayetteville, Arkansas, 1994.

Chamberlain 2000 – A. Chamberlain, *Problems and prospects in palaeodemography*, In M. Cox and S. Mays (eds), *Human Osteology in Archaeology and Forensic Science.* London, 2000, p. 101–115.

Christensen *et al.* 2011 – T. Christensen, M. Martínez-Lavín and C. Pineda, *Periostitis and Osteolysis in a Medieval Skeleton from South-West Hungary: (Leprosy, Treponematosis, Tuberculosis or Hypertrophic Osteoarthropathy) A diagnostic Challenge!* International Journal of Osteoarchaeology, 23 (1), 2011, p. 69–82.

Cohen 1994 – M.N. Cohen, *The Osteological Paradox reconsidered*, Current Anthropology, 35(5), 1994, p. 629–637.

Coughlan and Holst 2001 – J. Coughlan and M. Holst, *Health status*, in: V. Fiorato, A. Boylston and C.J. Knüsel (eds), *Blood Red Roses: the archaeology of a mass grave from the battle of Towton AD 1461*. Oxford, 2001, p. 60–76.

Curta 2006 – F. Curta, *Southeastern Europe in the Middle Ages, 500–1250*, Cambridge University Press, 2006.

DeWitte 2010 – S. DeWitte, *Sex differentials in frailty in Medieval England*, AJPA., 143, 2010, p. 285–297.

Djurić *et al.* 2006 – M.P. Djurić, C.A. Roberts, Z.B. Rakočević, D.D. Djonić and A.R. Lešić, *Fractures in late Medieval populations from Serbia*, AJPA., 130, 2006, p. 167–178.

Dunn 1972 – F.L. Dunn, *Intestinal parasitism in Malayan aborigines (Orang Asli)*, Bulletin of the World Health Organization, 46, 1972, p. 99–113.

Facchini *et al.* 2008 – F. Facchini, E. Rastelli and M.G. Belcastro, *Peri Mortem cranial injuries from a Medieval grave in Saint Peter's Cathedral, Bologna, Italy*, International Journal of Osteoarchaeology, 18, 2008, p. 421–430.

Gall 2005 – E. Gall, *Analysis and comparison of burial customs in the 10–11th century in the Transylvanian Basin, Crişana and Banat*, Dacia N.S., 48–49, 2005, p. 334–454.

Grauer 1993 – A. Grauer, *Patterns of anemia and infection from Medieval York*, AJPA., 91, 2005, p. 203–213.

Grauer and Roberts 1996 – A. Grauer and C. Roberts, *Paleoepidemiology, healing, and possible treatment of trauma in the Medieval cemetery population of St. Helen-on-the-Walls, York, England*, AJPA., 100, 1996, p. 531–544.

Grauer and Stuart-Macadam 1998 – A. Grauer and P. Stuart-Macadam (eds), *Sex and Gender in Paleopathological Perspective*, Cambridge, 1998.

Guy *et al.* 1997 – H. Guy, C. Masset and C.-A. Baud, *Infant taphonomy*, International Journal of Osteoarchaeology, 7, 1997, p. 221–229.

Hillson 2001 – S. Hillson, *Recording dental caries in archaeological human remains*, International Journal of Osteoarchaeology, 11, 2001, p. 249–289.

Hillson 1996 – S. Hillson, *Dental Anthropology,* Cambridge, 1996.

Howell 1982 – N. Howell, *Village composition implied by a palaeodemographic table: The Libben site*, AJPA., 76, 1982, p. 189–196.

İşcan *et al.* 1984 – M.Y. İşcan, S.R. Loth and R.K. Wright, *Metamorphosis at the sternal rib end: a new method to estimate age at death in white males*, AJPA., 65, 1984, p. 147–156.

Judd 2004 – M.A. Judd, *Trauma in the city of Kerma: ancient versus modern injury patterns*, International Journal of Osteoarchaeology, 14, 2004, p. 34–51.

Judd and Roberts 1998 – M.A. Judd and C.A. Roberts, *Fracture patterns at the Medieval Leper Hospital in Chichester*, AJPA., 105, 1998, p. 43–55.

Judd and Roberts 1999 – M.A. Judd and C.A. Roberts, *Fracture trauma in a Medieval British farming village*, AJPA., 109, 199, p. 229–243.

Jurmain 1999 – R. Jurmain, *Stories from the Skeleton. Behavioral Reconstruction in Human* Osteology, Amsterdam, 1999.

Knüsel 2001 – C.J. Knüsel, *Activity-related skeletal change*, in: V. Fiorato, A. Boylston and C.J. Knüsel (eds), *Blood Red Roses: the archaeology of a mass grave from the battle of Towton AD 1461*, Oxford, 2001, p. 103–118.

Knüsel 2005 – C.J. Knüsel, *The physical evidence of warfare – subtle stigmata?*, in: M. Parker-Pearson and I. Thorpe (eds), *Warfare, Violence and Slavery in Prehistory*, BAR International Series, 1374, 2005, p. 49–62.

Lovejoy *et al.* 1985 – C.O. Lovejoy, R.S. Meindl, T.R. Pryzbeck and R.P. Mensforth, *Chronological metamorphosis of the auricular surface of the ilium. A new method for the determination of adult skeletal age at death*, AJPA., 68, 1985, p. 15–28.

Lovell 1997 – N.C. Lovell, *Trauma analysis in palaeopathology*, Yearbook of Physical Anthropology, 40, 1997, p. 139–170.

Maples 1989 – W.R. Maples, *The practical application of age-estimation techniques*, in: M.Y. İşcan, and K.A.R Kennedy (eds.), *Reconstruction of Life from the Skeleton.* New York, 1989, p. 319–324.

Mays 2010 – S. Mays, *The Archaeology of Human Bones,* London, 2010.

Meier and Graham-Campbell 2007 – T. Meier and J. Graham-Campbell, *Life, death and memory*, in: J. Graham-Campbell and M. Valor (eds.), *The Archaeology of Medieval Europe.* Acta Jutlandica LXXXIII:1, Humanities Series 79. Aarhus University Press, 2007, p. 420–449.

Meindl *et al.* 1985(a) – R.S. Meindl, C.O. Lovejoy, R.P. Mensforth and R.A. Walker, *A revised method of age determination using the os pubis with a review and tests of accuracy of other current methods of pubic symphyseal aging*, AJPA., 68, 1985, p. 29–45.

Meindl *et al.* 1985(b) – R.S. Meindl, C.O. Lovejoy, R.P. Mensforth and L. Don Carlos, *Accuracy and direction of error in the sexing of the skeleton: Implications for palaeodemography*, AJPA., 68, 1985, p. 79–85.

Meşter 2011 – M. Meşter, *Anuarul Muzeului din Gherla. Arheologie, Istorie, Cultură*, Gherla, 2011.

Milner *et al.* 1989 – G.R. Milner, D.A. Humpf and H.C. Harpending, *Pattern-matching of age-at-death distributions in palaeodemographic analysis*, AJPA., 80, 1989, p. 49–58.

Murgescu 2001 – B. Murgescu (ed.), *Istoria României în texte*, Bucureşti, 2001.

Ortner 1998 – D.J. Ortner, *Male-female immune reactivity*, in: A. Grauer and P. Stuart-Macadam (eds.), *Sex and Gender in Paleopathological perspective.* Cambridge, 1998.

Ortner 2003 – D.J. Ortner, *Identification of pathological conditions in human skeletal remains*, 2nd ed. San Diego, 2003.

Phenice 1969 – T.W. Phenice, *A newly developed visual method of sexing the os pubis*, AJPA. 30, 1969, p. 297–302.

Roberts *et al.* 1998 – C.A. Roberts, M.E. Lewis and P. Boocock, *Infectious disease, sex, and gender: the complexity of it all*, in: A. Grauer and P. Stuart-Macadam (eds.), *Sex and Gender in Paleopathological perspective*, Cambridge, 1998, p. 93–113.

Roberts and Manchester 2010 – C. Roberts and K. Manchester, *The Archaeology of Disease*, Stroud, 2010.

Rogers *et al.* 1987 – J. Rogers, T. Waldron, P. Dieppe and I. Watt, *Arthropathies in palaeopathology: the basis of classification according to most probable cause*, JArS 14, 1987, p. 179–193.

Schaefer *et al.* 2009 – M. Schaefer, S. Black, L. Scheuer, *Juvenile Osteology: a Laboratory and Field Manual*, Elsevier Academic Press, 2009.

Šlaus 2008 – M. Šlaus, *Osteological and dental markers of health in the transition from the late Antique to the early Medieval period in Croatia*, AJPA., 136, 2008, p. 455–469.

Stirland and Waldron 1997 – A. Stirland and T. Waldron, *Evidence for activity-related markers in the vertebrae of the crew of the Mary Rose*, JArS, 24, 1997, p. 329–335.

Stirland 2005 – A. Stirland, *The Men of the Mary Rose. Raising the Dead*, Sutton, 2005.

Stuart-Macadam 1992 – P. Stuart-Macadam, *Porotic hyperostosis: a new perspective*, AJPA., 87, 1992, p. 39–47.

Sullivan 2005 – A. Sullivan, *Prevalence and etiology of acquired anemia in Medieval York, England*, AJPA., 128, 2005, p. 252–272.

Todd 1920 – T.W. Todd, *Age changes in the pubic bone*, *I. The male white pubis*, AJPA., 3, 1920, p. 285–334.

Trotter and Gleser 1952 – M. Trotter and G.C. Gleser, *Estimation of stature from long bones of American Whites and Negroes*, AJPA., 10, 1952, p. 463–514.

Van Beek 1983 – G.C. Van Beek, *Dental morphology. An illustrated Guide*, Bristol, 1983.

Waldron 2009 – T. Waldron, *Palaeopathology*, Cambridge, 2009.

White and Folkens 2005 – T.D. White and P.A. Folkens, *The Human Bone* Manual, Academic Press, 2005.

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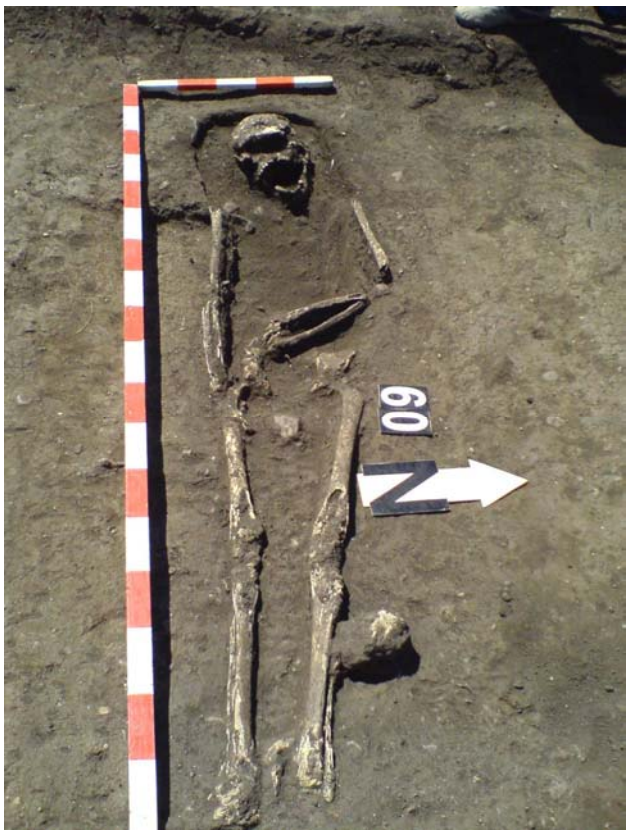

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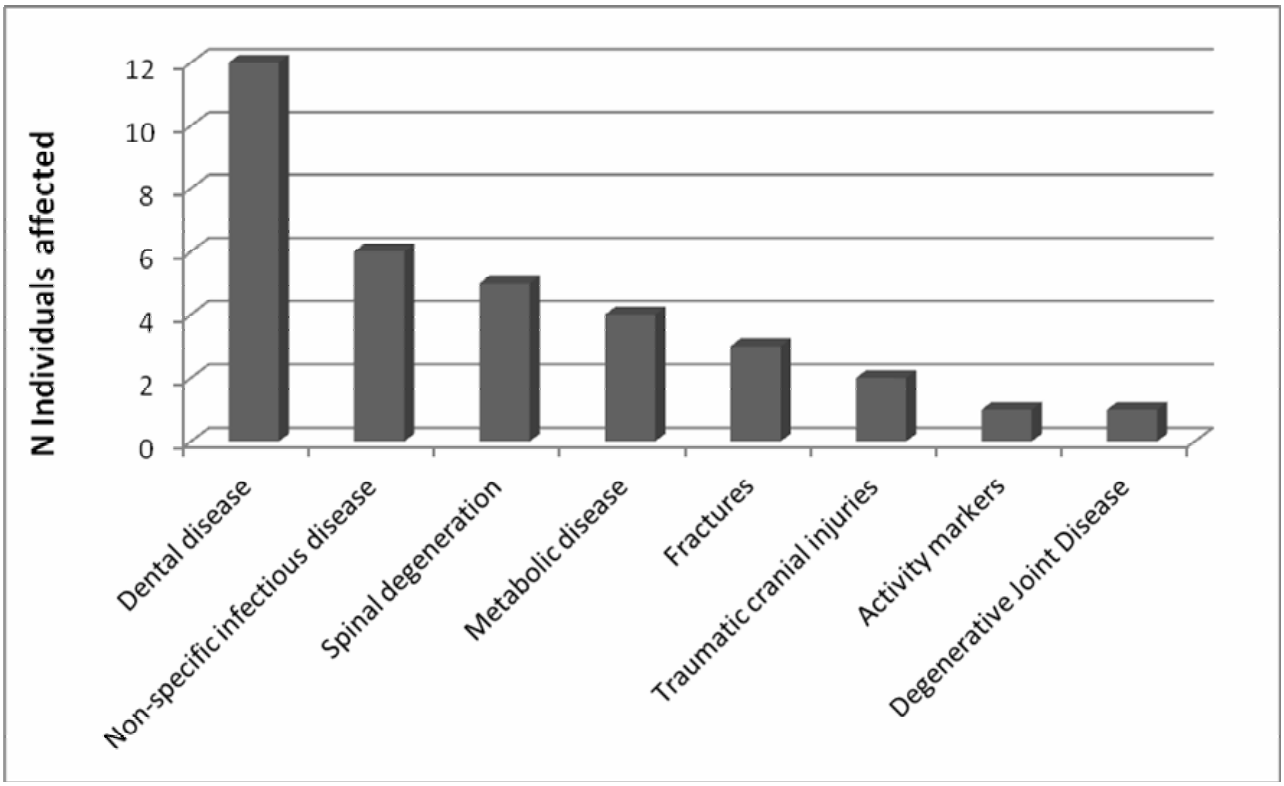

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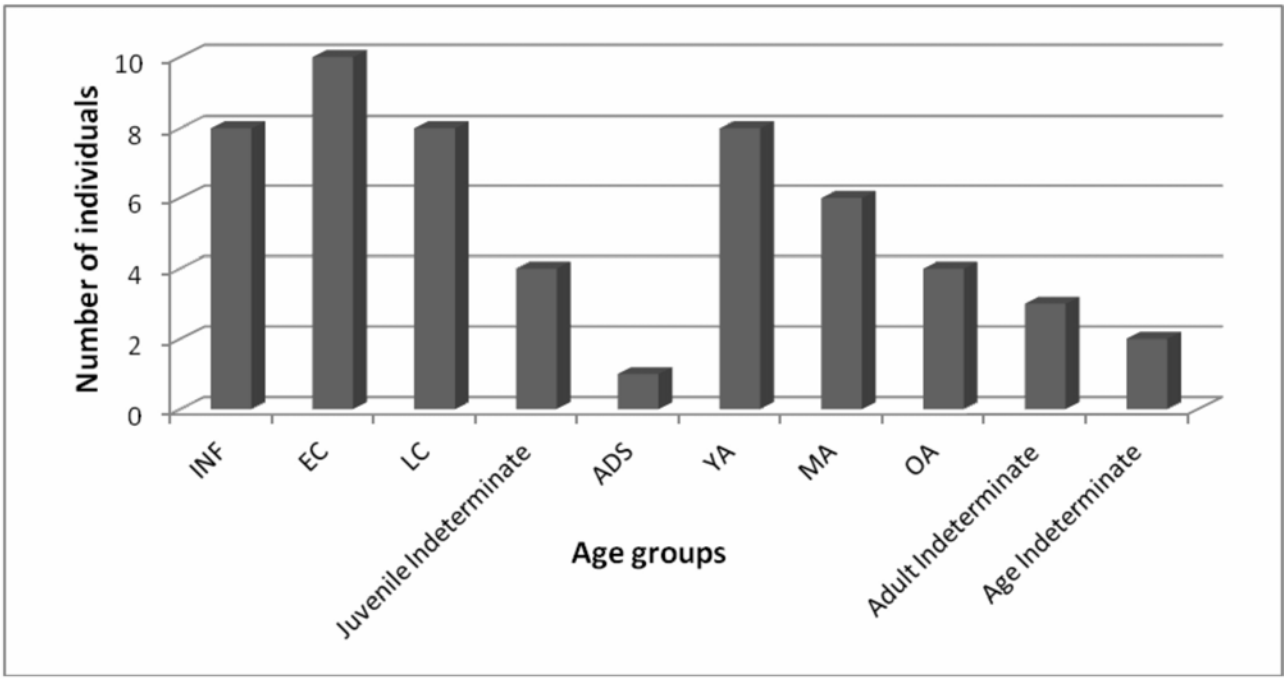

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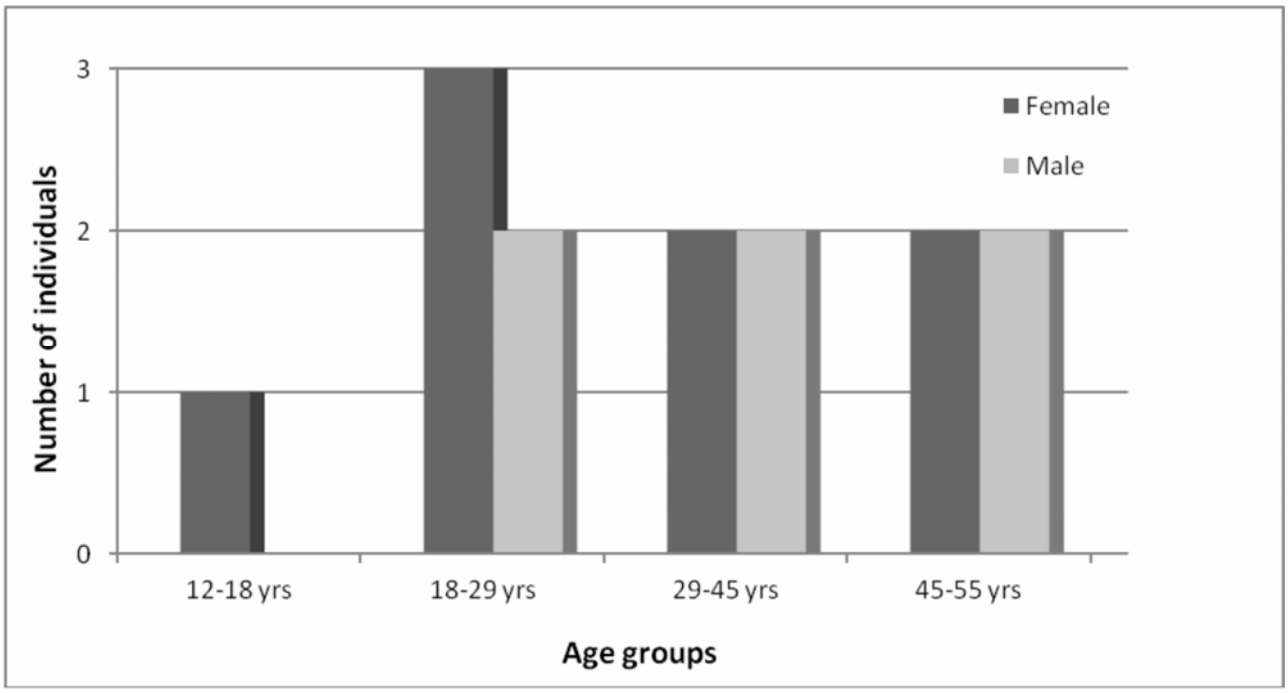

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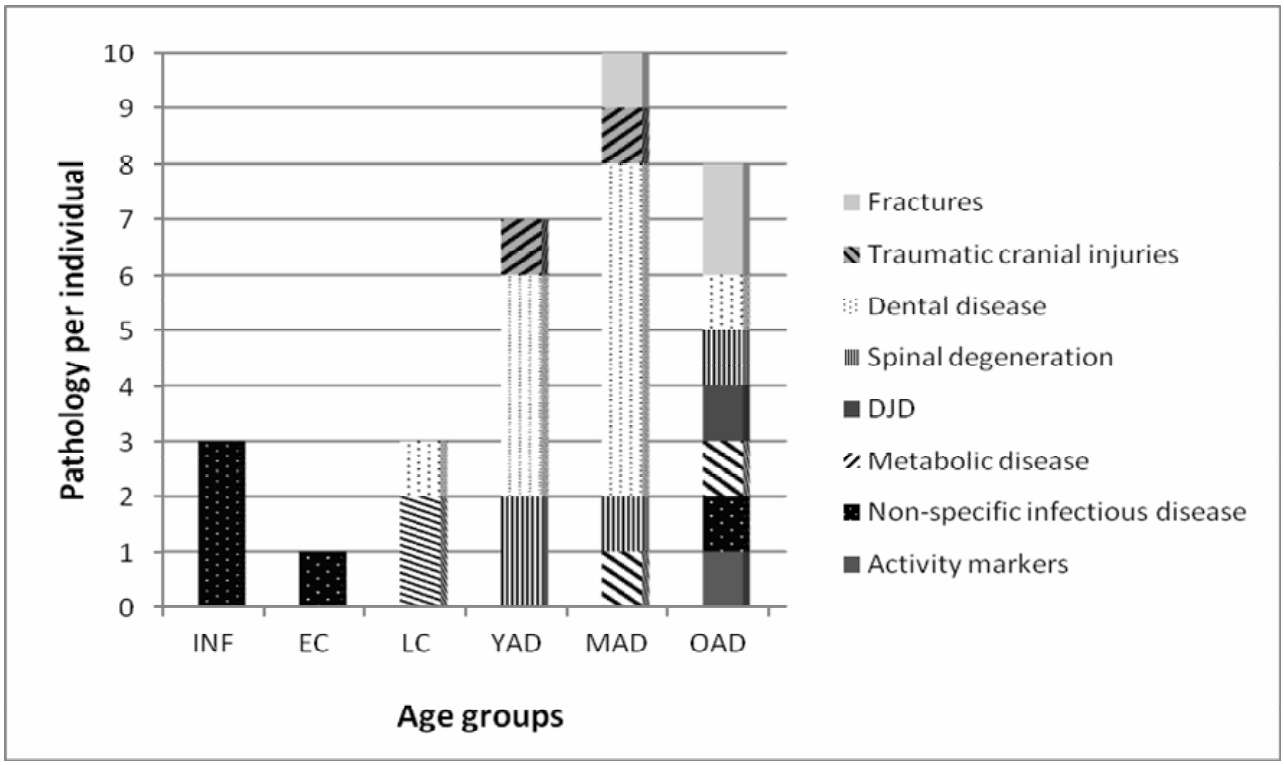

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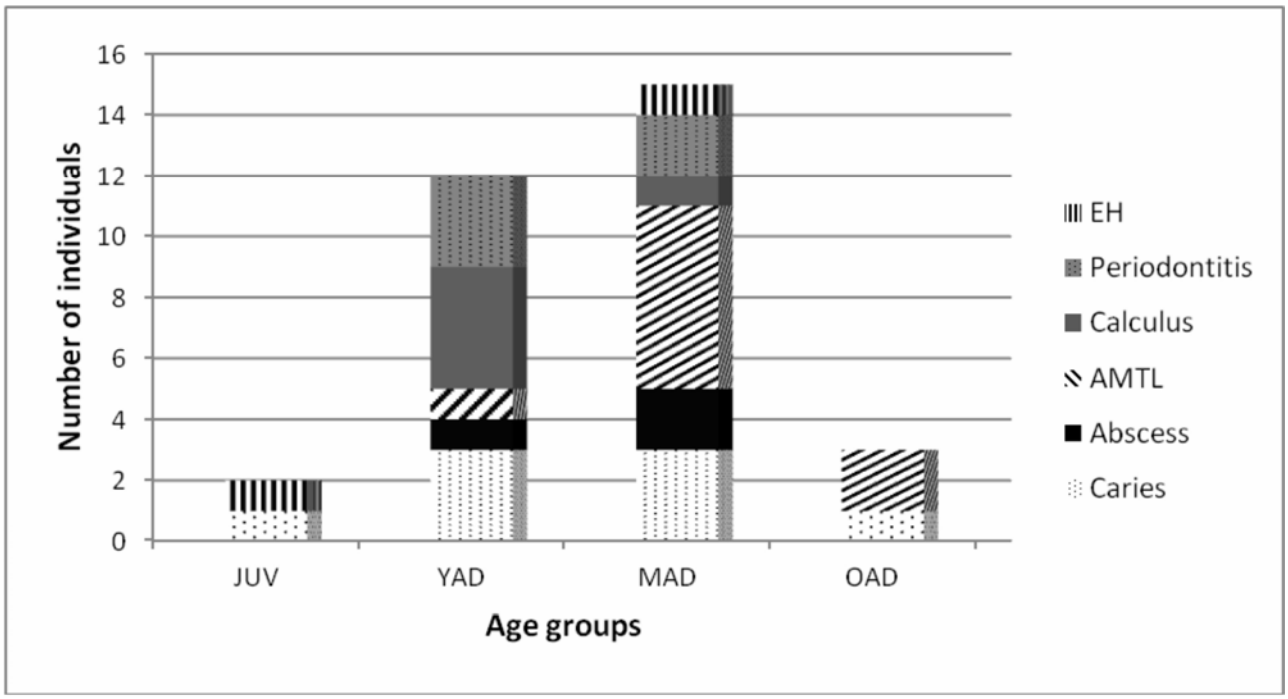

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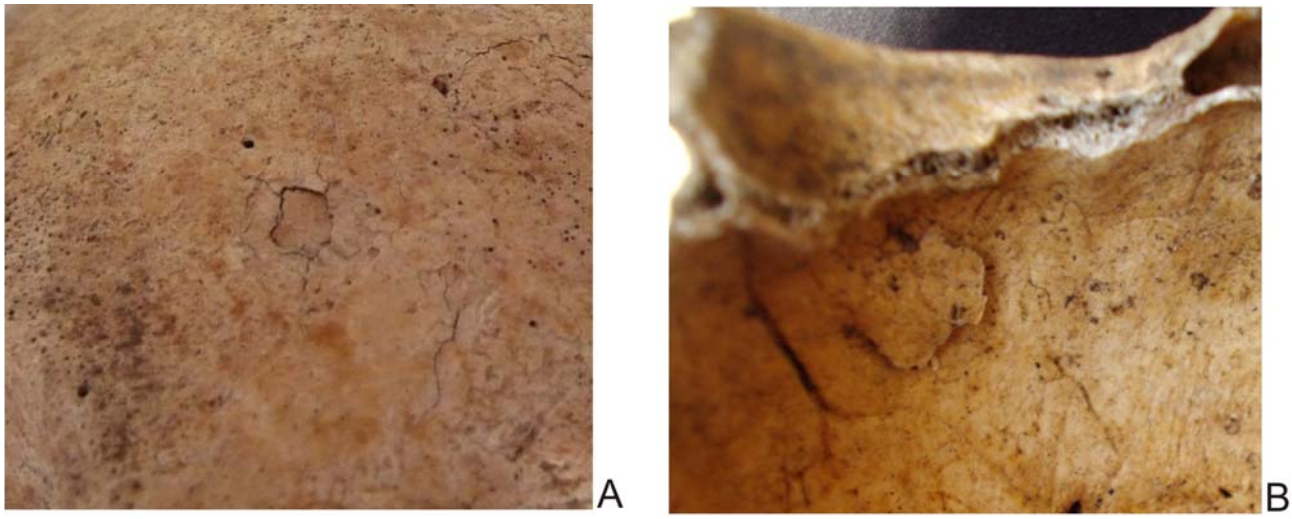

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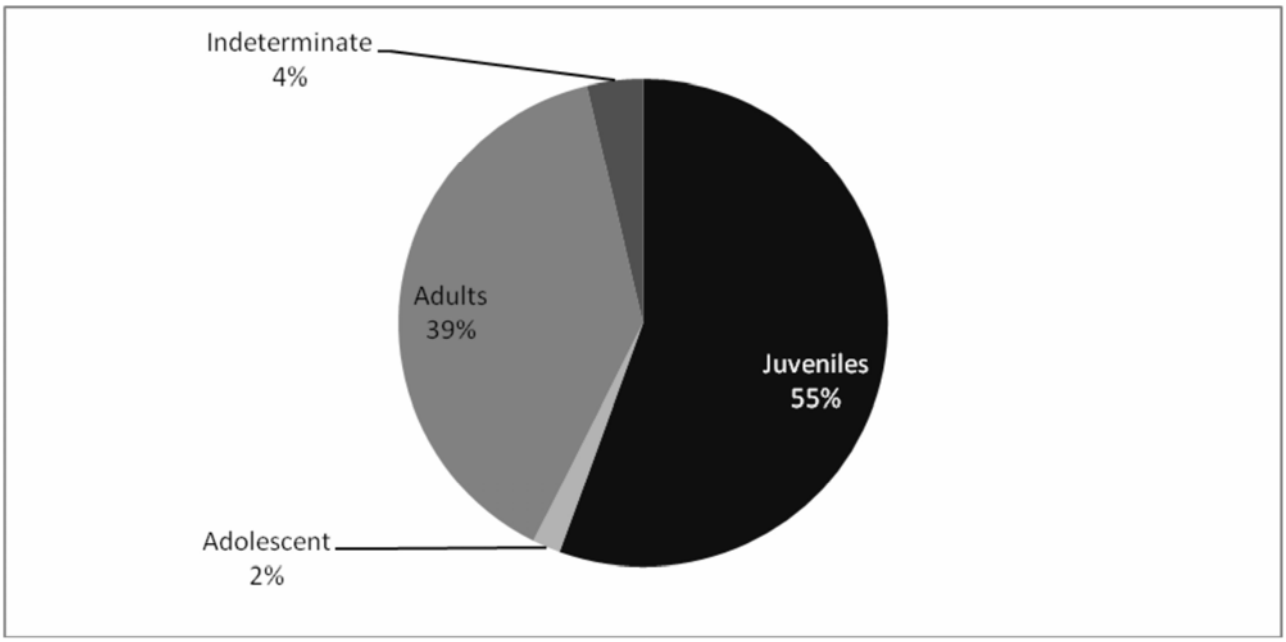

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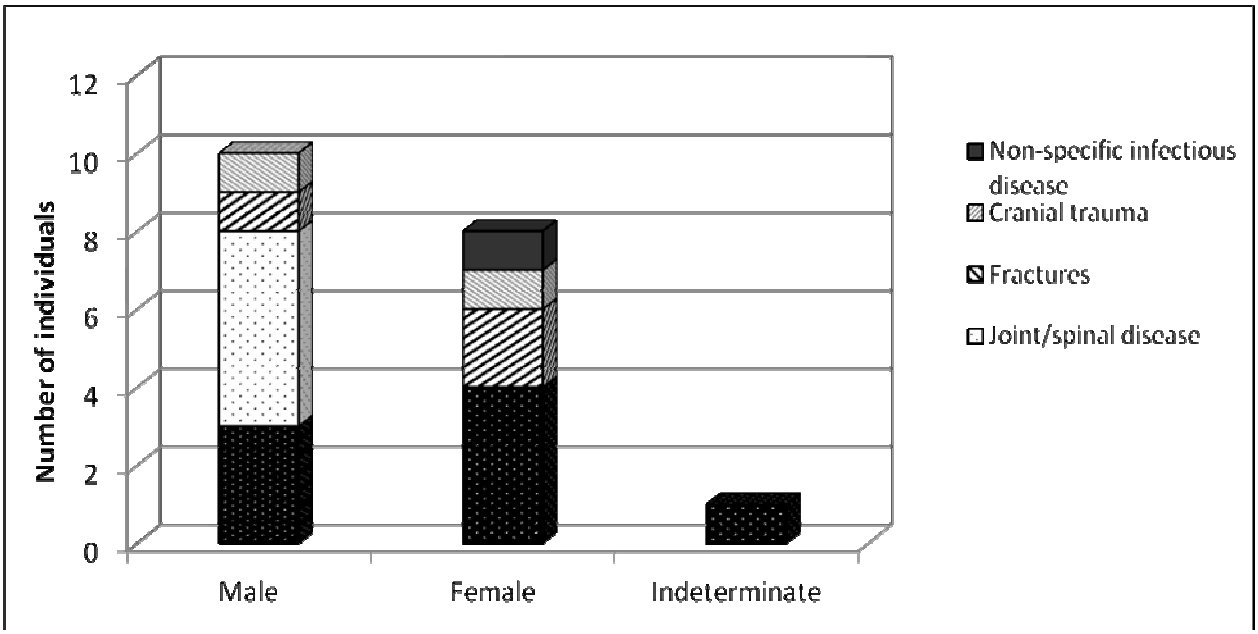

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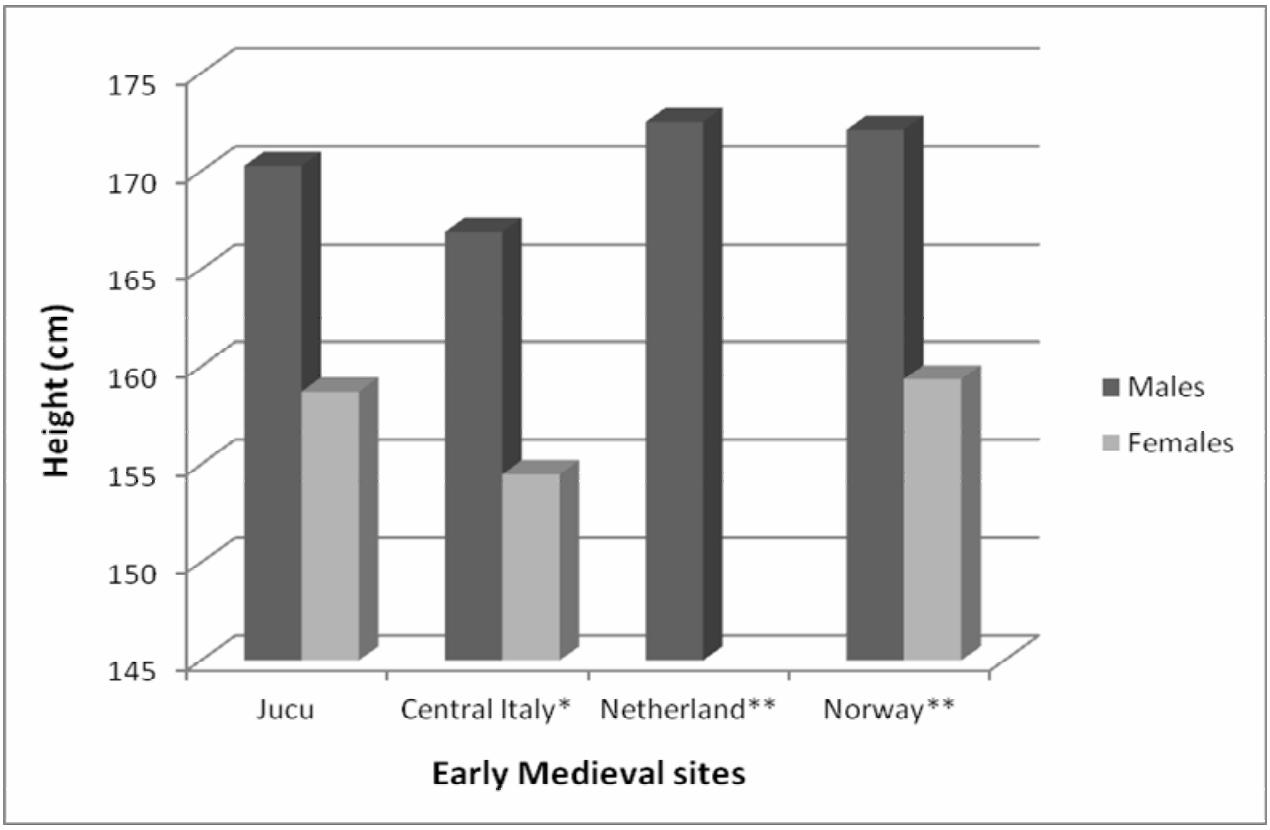

Fig. 14. Comparison between the estimated stature (in cm) from Jucu and other European sites dating back to the Early Medieval period.
Sources: * Giannecchini and Moggi-Cecchi 2008; **Baetsen 1998.

Table 1
A list of the skeletons analysed, including information about their state of preservation and demographic features.

M	MNI	Isolated bones	Preservation	Sex	Age category	Age	Stature	Pathological lesions	Remarks
1	1		Excellent	F	A	?			Not analysed, exposed at the museum
4 (A)	1		Good	?	EC	5 yrs +/- 16 mths	?	Woven bone on limbs.	Green stain on R mandibular condyle.
4 (B)		1 Scapula	Poor	?	A	?	?		
5	1		Fair	F	MA	25-30	153 ~		Green stain on R shaft of ulna.
8	1		Fair	?	EC	5 yrs +/- 16 mths	?		
10		1 Cranium	Poor	?	J	?	?		
11		1 Cranium	Poor	?	YA	?	?		
13	1		Poor	?	MA	?	?	AMTL, calculus.	
16	1		Poor	?	A	?	?		
17	1			?	A	?	?		
19 (A)	1		Poor	M?	MA	35-45 yrs?	?	AMTL	
19 (B)	1		Fair	?	EC	5 yrs +/- 16 mths			
21 (A)	1		Poor		LC	11 yrs +/- 30 mths			
21 (B)	1		Fair		INF	< 1 yr?			
23 (A)	1		Good	M?	YA	20-25 yrs	174 ~	Caries, calculus, Schmorl's nodes.	
23 (B)	1	1 Cranium	Fair	F?	MA	35-45 yrs?		AMTL.	
24	1		Excellent	M	MA	25-35 yrs	172 ~	Schmorl's nodes, osteophytes.	Two big Wormian bones at lambda.
25 (A)	1		Good		INF	6-18 mths		Woven bone on lower limbs.	
25 (B)	1		Fair		LC	11 yrs +/- 30 mths		Caries?	
25 (C)		Spine only - in anatomical connection	Poor		A	?			
26 = 32	1		Good		LC	10 yrs +/- 30 mths		Porotic hyperostosis, possible erosive lesions on prox anterior medial surface of both femora.	
28	1		Poor		INF	<3?		Woven bone on frontal.	
29	1		Poor	F?	YA	17-25 yrs		Caries, calculus.	Green staining on right temporal.
37	1		Poor		INF	18 mths +/- 6 mths			
38	1		Poor		INF	?			
39	1		Poor		EC	?			
40	1		Poor	F?	YA	20-24 yrs			Very neat fracture of the R femur mid-shaft.
41	1		Poor		J	?			
42	1		Poor		EC	5 yrs +/- 1.5 yrs			
44	1		Poor		LC	8 +/- 2 years			
45	1		Poor		LC	6 +/- 2 yrs			
46	1		Poor		EC	?			

Table 1 *(continued)*

M	MNI	Isolated bones	Preservation	Sex	Age category	Age	Stature	Pathological lesions	Remarks
47	1		Poor	??	MA	35-40 yrs?		Possible healed fracture on ulna, AMTL, caries, abscess.	
48	1		Poor		?	?			
49	1		Poor		A	?			Fragments of lower limbs only.
51	1		Good	F	OA	45+ yrs	164.33 ~	AMTL, calculus, periodontitis, caries, woven bone on cranium and mandible. Possible trauma on R side of forehead.	
52	1		Poor		LC	?			
53	1		Good	F	OA	50+ yrs	158.44	Bony callus on left ulna, AMTL, porosity on cranium.	Metopic suture. Green staining on right phalanges.
54	1		Poor	M?	OA	45+ yrs?		Bony callus on left ulna, AMTL, caries.	
56	1		Poor		J	?			
57 (A)	2		Poor	?	YA	17-25			
57 (B)	1		Poor		LC	8-10 yrs?			
60	1		Fair	M	OA	45-50+ yrs		Spinal degeneration and OA, Schmorl's nodes, bony callus on ribs.	
62 (A)	1		Excellent		LC	8-10 yrs		Enamel hypoplasia and cribra orbitalia.	Green stain on R gonion - cylindric glass beads.
62 (B)		Hand bones only	Poor		A	?			
63	1		Fair		INF	1 yr?		Woven bone on R temporal, R orbit, R posterior humerus shaft.	
64	1		Fair	F?	YA	17-25			
65	1		Good		INF	18 mths +/- 6 mths			
67	1		Poor	??	MA	?		AMTL, severe caries, roots exposure, abscess, EH.	
69	1		Excellent	M	YA	20-29 yrs	169.13 ~	Schmorl's nodes, AMTL, calculus, roots exposure, possible trauma on occipital.	
70	1		Good		EC	5 yrs +/- 1.5 yrs			
71	1		Poor		J	?			
72	1		Good	??	YA	20-25 yrs	165.47 ~	Caries, abscess, cranial trauma.	
73	1		Poor		??	?			
75	1		Poor		EC	5 yrs +/- 1.5 yrs			
76	1		Good		EC	4 yrs +/- 1 yr			Beads from necklace
77	1		Fair		ADS	15-17 yrs			Slavic bronze ear-ring.
83	1		Fair		INF	1-2 yrs			
87	1		Poor		J	?			
88	1		Fair		EC	3 yrs +/- 1 yr			
tot	**55**	**5**							

Poor, almost inexistent preservation

**MNI = Minimum Number Individuals; A = Adult; J = Juvenile; INF = Infant; CHL = Child; YAD = Young Adult; MAD = Middle/Mature Adult; OAD = Old Adult; yrs = Years; mths = Months; F = Female; M = Male; AMTL = Antemortem Tooth Loss.*

Table 2
Age classes adapted from Buikstra and Ubelaker 1994.

CATEGORY	NAME	ABBREVIATION	AGE
Juveniles	Foetus	FOET	Pre-natal
	Infant	INF	0 – 2 years
	Early childhood	EC	2 – 5 years
	Late childhood	LC	5 – 12 years
	Adolescent*	ADS	12 – 18 years
Adults	Young Adult	YA	18 – 29 years
	Middle Adult 1	MA1	30 – 39 years
	Middle Adult 2	MA2	39 – 45 years
	Old Adult	OA	45 – 55 years
	Senile	S	55 + years

**The event delimitating the passage between adolescence and young adulthood is in this study the eruption of third molars: when those are present, the individual is considered to be a young adult.*

Table 3
Comparison between estimated stature (in cm) of the better-preserved male and female skeletons from Jucu.

Skeleton	Male	Female
M 05		153,38
M 23 (1)	174,18	
M 24	172,32	
M 51		164,33
M 53		158,44
M 69	169,13	
M 72	165,47	
Mean	**170,27**	**158,71**

Table 4
Comparison between measurements (in cm) of three diagnostic parts of the humerus from the better-preserved males and females.

MALES						
Skeleton	**Hum Max Length**		**Hum Max Diam Head**		**Hum Bicondylar width**	
	R	**L**	**R**	**L**	**R**	**L**
M 23 (1)	33.3					6.2
M 24	31.8		4.5		6.35	6.1
M 60					6.9	6.9
M 69	31.2	32	4.4	4.3		6.55
M 72	31.4	31.7	4.6			
Mean	**31.92**	**31.85**	**4.5**	**4.3**	**6.62**	**6.43**

FEMALES						
Skeleton	**Hum Max Length**		**Hum Max Diam Head**		**Hum Bicondylar Width**	
	R	**L**	**R**	**L**	**R**	**L**
M 05		28.5		4		5.7
M 51	31	31.3	4.3	4.3	6	5.8
M 53	30.5	30	4.35	4.25	4.15	4
M 64	30.5					
Mean	**30.6**	**29.9**	**4.32**	**4.18**	**5**	**5.16**

Table 5
Comparison between measurements (in cm) of two diagnostic parts of the femur from better-preserved males and females.

MALES				
Skeleton	**Fem Max Diam Head**		**Fem Midshaft Circumf**	
	R	**L**	**R**	**R**
M 24	4,9		9,4	9,3
M 53			9	
M 60	5,1		9,5	
M 69	5,1	5	9	9
Mean	**5**	**5**	**9,22**	**9,15**

FEMALES				
Skeleton	**Fem Max Diam Head**		**Fem Midshaft Circumf**	
	R	**L**	**R**	**L**
M 05	4,5	4,5	8,5	8,5
M 29		3,8		7,3
M 40		4	7,5	
M 51	4,4	4,35	8	8,3
M 53	4,2	4,2	7	7
M 64	4,25		8,5	
Mean	**4,33**	**4,17**	**7,9**	**7,77**