Mario Novak – Zrinka Premužić – Vlasta Vyroubal – Mario Šlaus

BIOARCHAEOLOGY OF THE LATE ANTIQUE POPULATION FROM ŠTRBINCI

Dr. sc. Mario Novak
HR – 10000 Zagreb
Hrvatska akademija znanosti i umjetnosti
Odsjek za arheologiju, Ante Kovačića 5
mnovak@hazu.hr

Zrinka Premužić
HR – 10090 Zagreb
Gajnice 6
zrinka.premuzic@zg.t-com.hr

Vlasta Vyroubal
HR – 10000 Zagreb
Hrvatska akademija znanosti i umjetnosti
Odsjek za arheologiju, Ante Kovačića 5
vlasta.vyroubal@gmail.com

Dr. sc. Mario Šlaus
HR – 10000 Zagreb
Hrvatska akademija znanosti i umjetnosti
Odsjek za arheologiju, Ante Kovačića 5
mario.slaus@zg.htnet.hr

UDK 902:572(497.5-11)
Izvorni znanstveni rad
Primljeno: 7. XI. 2008.
Prihvaćeno: 14. I. 2009.

The purpose of this article is to synthesise bioarchaeological data from the late Antique Štrbinci skeletal series and present it by grave unit and individual skeleton, and to compare the bioarchaeological characteristics of this sample with the Antique sample from the Zadar – Relja site. Due to their different geographical location, climate and ecological settings, significant differences in life conditions and quality of life between these two samples can be expected. To determine if these environmental factors had any effect on life conditions of these populations a detailed anthropological analysis was conducted. All skeletons were analysed for sex, age, dental pathologies, subadult stress indicators, non-specific infectious diseases, osteoarthritis, Schmorl's nodes and trauma.

Data collected from this study demonstrated that, with the exception of one skeletal indicator of dental disease (caries), one skeletal indicator of subadult stress (the active form of cribra orbitalia) and one skeletal indicator of physical activity (Schmorl's nodes), no significant differences in the quality of life are present between individuals who inhabited Štrbinci and individuals who inhabited Zadar during the late Antique period. The results of this research strongly suggest similar levels of stress between the two analysed populations which were most probably the result of similar social and economical circumstances.

Key words: bioarchaeology, dental pathologies, subadult stress, traumas, late Antique period, Štrbinci, Zadar – Relja (*Ključne riječi: bioarheologija, dentalne patologije, subadultni stres, trauma, kasnoantičko razdoblje, Štrbinci, Zadar – Relja*)

INTRODUCTION

Human osteological material from archaeological sites is an important resource for understanding the living conditions and way of life of archaeological populations. Anthropological studies of various archaeological populations around the world clarified numerous complex interactionable processes between man and his environment in the past (e. g. Larsen 1997; Owsley & Jantz 1978), provided of numerous migrations and the effects of those migrations (e. g. Schwidetzky & Rösing 1984), and provided insight in the living conditions and a way of life of archaeological populations (e. g. Steckel & Rose 2002; Šlaus 2006).

In the last decade there has been an increased interest in the bioarchaeology of the Antique period skeletal samples from Croatia (Hincak et al. 2007; Novak 2007; Rajić & Ujčić 2003; Šlaus 1998, 1999, 2001, 2002a, 2002b; Šlaus et al. 2004a, 2004b). The main problem of these skeletal samples was the inadequate size and susceptibility to the local characteristics. This situation created the need to analyse a larger, well preserved, reliably dated and systematically excavated Antique sample, such as the Štrbinci skeletal series which resulted in three papers dealing with the skeletal biology of this population in recent years (Šlaus 1998, 2001; Šlaus et al. 2004a). Systematic archaeological excavations which have been recently conducted in Štrbinci resulted in a significant increase of this skeletal series resulting in a need for a comprehensive study of this site.

The purpose of this paper is to synthesise the data currently available for the Štrbinci skeletal series and to present it by grave unit and by individual skeleton. The bioarchaeological characteristics of this sample will be compared with the late Antique sample from the Zadar – Relja site. Although dated to the same period, their geographical location, climate and ecological settings differ, so one can only reasonably expect significant differences in life conditions and quality of life between these two samples.

The following pathologies were analysed in this study: dental pathologies (caries and alveolar bone disease), subadult stress indicators (linear enamel hypoplasia and cribra orbitalia), non-specific infectious diseases (periostitis), osteoarthritis on vertebrae and major joints, Schmorl's nodes on vertebrae and traumas. These pathological conditions are common in the skeletal material and, when assembled, create an insight into general health and quality of life of a certain population.

Due to the significantly different geographic location and climatological and ecological settings between Štrbinci and Zadar different levels of stress between these populations can be expected. Štrbinci is located in the Roman province of Pannonia (modern continental Croatia) while Zadar is located in the province of Dalmatia (eastern Adriatic coast).

The original inhabitants of the Pannonia were the Pannonii, a group of tribes similar to Illyrians. In the 4th century BC various Celtic tribes settled in the area. In 35 BC this region was invaded by Romans led by Augustus, but the country was not subdued until 9 BC, when it was incorporated into the province of Illyricum. After the province of Illyricum was dissolved, its lands were divided between the new provinces of Pannonia in the north and Dalmatia in the south. The area is characterised by a continental climate, with harsh winters and hot summers. It is rich in rivers that combined with the predominantly flat terrain result in marshes.

Dalmatia's name is derived from the name of an Illyrian tribe called the Dalmatae who lived in the area of the eastern Adriatic coast in the 1st millennium BC. This region was slowly incorporated into the Roman territory from the 2nd century BC to around 32-27 BC. In 9 AD inhabitants of Dalmatia, together with Pannonians raised a revolt which was brutally crushed. In 10 AD Illyricum was split into two provinces, Pannonia and Dalmatia which spread into larger area inland to cover all of the Dinaric Alps. The eastern Adriatic coast has a Mediterranean climate, with short, wet winters and dry and hot summers. The area has few rivers that frequently disappear into limestone subterranean passages.

In addition, one has to bear in mind that potential differences between the two samples might also occur due to the fact that Štrbinci was a relatively small community, possibly rural, while Zadar was a large urban centre.

MATERIALS AND METHODS

Archaeological excavations of the late Antique cemetery in Štrbinci near Đakovo (**Figure 1**), the presumed location of the Roman settlement *Certissia*, started in 1993. The excavations have been systematically conducted from 1999 under the leadership of B. Migotti from the Department of Archaeology of the Croatian Academy of Sciences and Arts and I. Pavlović from the Museum of the Đakovo Region (until 2004) (Migotti & Pavlović 2005). All burials found in Štrbinci were inhumations. Three types of graves were noted: grave vaults, earth graves and graves containing wooden caskets, which are distinguishable by the presence of a large number of nails and the remains of wood. The majority of the grave vaults were completely destroyed (Migotti & Pavlović 2005). Grave accessories (glass and pottery vessels; bronze coins; glass, amber, bone and metallic jewellery; parts of clothing etc.) date the use of this

Figure 1 Geographical location of the Štrbinci and Zadar – Relja late Antique sites (M. Novak, 2008).

cemetery to the second half of the 4th century and possibly to the beginning of the 5th century AD (Migotti 2006). A total of 150 skeletons were available for anthropological analysis, with the degree of preservation ranging from good to excellent.

Zadar was founded as a Roman colony (*Iader*) possibly by Caesar or by the emperor Augustus. During the Antique period it was one of the largest urban centres on the eastern Adriatic coast. Because of urban construction, rescue excavations of Roman necropolis were carried out in 1989/1990 in the city district Relja. Two types of burials are present in the site: incinerations and inhumations. Incinerated burials were very rich, especially numerous were the glass vessels in these graves, while the inhumated burials contained primarily pottery and coins (Brusić & Gluščević 1990). Rescue excavations conducted in 2005 and 2006 were led by I. Fadić from the Archaeological museum in Zadar (Fadić 2006a, 2006b, 2006c). Graves from which osteological material was recovered were simple inhumations in plain ground or graves covered with *tegulae* (roof tiles) or fragments of amphorae. Grave goods (coins, pottery, pins, *fibulae*, glass vessels etc.) date the use of Roman necropolis between 1st and 4th century AD (Brusić & Gluščević 1990) (incinerated burials are dated to the 1st and

2nd century, and inhumated burials are dated to the 3rd and 4th century AD) (Brusić & Gluščević 1990; Fadić 2006a, 2006b, 2006c). For the purpose of this article a total of 255 skeletons from inhumation graves were available for anthropological analysis, with the degree of preservation ranging from poor to excellent.

During anthropological analysis, an inventory of preserved bones was conducted, the sex was determined and age at death was assessed, and present pathological changes were analysed.

After inventorying, the sex of the individuals was determined. An anthropomorphic method based on general morphological differences between male and female skeletons was used. Both cranial and postcranial elements were taken into consideration. Sex was determined based on pelvic (Kimura 1982; Krogman & Işcan 1986; Phenice 1969; Sutherland & Suchey 1991; Weaver 1980) and cranial (Krogman & Işcan 1986) morphology. The sex of subadults was not determined.

Age at the time of death was determined on the basis of changes which occur on osteological tissue during the growth and aging of an individual, using as many methods as possible in order to avoid mistakes. The dominant methods are changes to the pubic symphysis (Brooks & Suchey 1990), the auricular surfaces of the pelvis (Lovejoy et al. 1985) and the sternal ends of the ribs (Işcan et al. 1984, 1985). Additional methods used to confirm or provide more accurate age estimation were: the degree of obliteration of the cranial and maxillary sutures (Meindl & Lovejoy 1985), degenerative osteoarthritic changes on the joint surfaces of other bones (Mann & Jantz 1988; Meindl & Lovejoy 1985; Pfeiffer 1991) and degree of abrasion on occlusal surfaces of the teeth. The age of subadult skeletons was estimated on the basis of changes that occur during the formation and growth of deciduous and permanent teeth, the degree of ossification of bones (connection between epiphysis and diaphysis) and based on the length of the diaphysis of other bones (Bass 1995; Fazekas & Kósa 1978; McKern & Stewart 1957; Moorees et al. 1963; Scheuer & Black 2000). The age of subadults was determined from a range of one to three years, while the age of adults covered a range of five years (e.g. from 31 to 35 years). All individuals over sixty years of age were classified in a single open ended group 60+. Mortality rates for the populations analysed in this paper are expressed through the following formula: d(x) = D(x)/total number of individuals x 100. In this formula "D(x)" represents the number of individuals who died during the particular span of time (five-year age categories, e.g. 41-45), while "d(x)" represent the percentage of individuals who died during the particular span of time in relation to the complete sample.

In all skeletons, the possibility of the following pathological changes were analysed: dental caries, alveolar bone disease, linear enamel hypoplasia, cribra orbitalia, non-specific infectious diseases (periostitis), osteoarthritis on vertebrae and major joints, Schmorl's nodes on the vertebral body and traumas. These pathologies were selected for two reasons: 1) all of these changes can be relatively easily observed by macroscopic analysis of osteological material, and 2) cumulatively these pathologies provide an insight into the quality and conditions of life of the analysed population.

Dental caries is the most common infectious disease affecting humans (Balakrishnan et al. 2000). It is a bacterial infection characterised by demineralisation of anorganic portions and destruction of organic portions of the teeth. This disease is by nature progressive, because maintenance of the same conditions that cause carious lesions ultimately leads to complete destruction of the tooth (Pindborg 1970). Caries is easy to recognise in archaeological material based on the characteristic cavities that form on the crown or root of the tooth. Cavities may vary in size, from small and shallow ones to those which fully destroy the crown or root of the tooth. The presence of caries was diagnosed macroscopically, under strong illumination, with the help of a dental probe.

For the purposes of this analysis, alveolar bone disease is defined as the presence of periodontal or periapical abscess, or antemortem tooth loss. Once caries enters the pulpal chamber, bacteria cause inflammatory responses – abscesses that may eventually result in the loss of the tooth during individual's lifetime (Cucina & Tiesler 2003).

Linear enamel hypoplasia (LEH) is recognized as horizontal lines or deficiencies of the amount or thickness of enamel on the buccal surface of teeth (Goodman & Rose 1990; Suckling 1989). This is a subadult disorder which has long been used as a nonspecific indicator of systemic physiological stress (Guatelli-Steinberg & Lukacs 1999; Goodman & Rose 1990). The presence of linear enamel hypoplasia was analysed on the permanent maxillary central incisors and on the maxillary and mandibular canines. Data were collected only for adults. It is recognized that not including subadult dentition in the analysis is a limitation of the study, but the following reasons prohibited it. Deciduous incisor and canine crowns develop *in utero* and therefore reflect pre-natal stress. The analysis of permanent incisors and canines in the subadult dentition is therefore the logical solution to this problem, but leads to the following complications. Permanent maxillary central incisors erupt at about 6-6.5 years, maxillary canines at about 10.5-12.0 years and mandibular canines at about 9-10.5 years. This means that no LEH data would be available for the two youngest subadult age categories (0-1 and 2-5 years). An additional complication in the analyzed data set was the poor preservation of permanent incisors and canines in subadult remains (Šlaus 2008).

Cribra orbitalia, i. e. porotic hyperostosis of the orbital roof, appears morphologically as a porous, gently extruding bone on the upper arches of the eye socket. It is believed to be a result of anaemia, especially iron deficiency anaemia (E1-Najjar et al. 1976; Taylor 1985; Ubelaker 1992). The most frequent etiologies of anaemia are parasitic disease (Larsen & Sering 2000; Reinhard 1992), chronic iron deficiency caused by lack of iron in the diet (E1-Najjar et al. 1976), thalassemia (Ascenzi et al. 1991), or chronic malnutrition. Changes can be observed in both adults and subadults, and it may occur in an active or healed condition. Research of archaeological populations from different parts of the world has shown that active forms of this pathology are almost exclusive to subadults (Mensforth et al. 1978; Mittler & Van Gerven 1994; Walker 1986; but see also Sullivan 2005) suggesting that cribra orbitalia is an osteological response to childhood anaemia (Stuart-Macadam 1985). During analysis, all skulls with preserved orbital roofs were macroscopically examined under powerful illumination, and all observed lesions were classified based on condition (active or healed) and intensity (mild, moderate or severe) at time of death.

Infectious diseases were the leading cause of death in archaeological populations, particularly during earliest childhood (Ortner 2003). Most infectious diseases present in archaeological populations have a non-specific origin, which means that pathological changes were caused by different microorganisms with unidentified etiologies. Infectious disease is the most common cause of non-specific periostal reactions (Ortner 2003). Abnormal bone formation that affects the outer (periostal) surface of bone, i. e. inflammation of the peripheral bone, is called periostitis. In active condition, periostitis is usually grey or brown in colour, porous; with well defined and gently raised edges (its appearance recalls tree bark). When healed, the new, weakly organised bone remodels into a lamellar bone and forms a connection with the cortical bone, so that the affected portion of the bone assumes a wavy, slightly inflated appearance (Šlaus 2006). Only cases of non-specific periostitis were included in this analysis. Non-specific periostitis was diagnosed when two or more skeletal elements, excluding the endocranial surfaces of the skull, exhibited active or healed periostitis. Criteria for inclusion in the sample were the presence of at least 50% of all cranial bones and long bones. Trauma induced periostitis cases were not taken into consideration. In individuals with evidence of trauma, periostitis was not considered present if it was located on the same bone on which the fracture was located.

Extensive physical work, as well as habitual activities, leaves traces in the human organism. Cunha & Umbelino (1995) list as much as 140 skeletal markers of occupational stress which are result of continuous use of specific motions associated with everyday activities related to food processing, work and hobbies. In this paper, particular attention has been accorded to degenerative changes (osteoarthrosis) on major joint surfaces and vertebrae, and to Schmorl's nodes on vertebrae.

Schmorl's nodes are intravertebral herniations of intervertebral disc tissue, caused by the prolapse of the intervertebral disc in the body of the vertebra. They are recognised morphologically as shallow round or kidney-shaped defects, usually not greater than one centimetre in diameter, on the superior or inferior surface of the body of the vertebra. Although the etiology of Schmorl`s nodes is not yet completely understood, continuous physical exertions are considered to be the major cause (McWhirr et al. 1982; Schmorl & Junghanns 1971).

Osteoarthritis, or degenerative joint disease, is perhaps the most commonly documented pathological condition of the human skeleton (Lieverse et al. 2007). Sex, body build, nutrition, endocrine status, and heredity have some influence, but physical activity and mechanical stress are the primary contributing factors (Jurmain 1999; Larsen 1997). Research of frequency and distribution of osteoarthritis may provide an important record of types of activity and mechanical stress levels experienced by individuals, thus enabling an insight into human adaptation and cultural change in populations (Bridges 1991; Jurmain & Kilgore 1995). Degenerative changes can be distinguished depending on their severity: osteophytes, porosity and eburnation. This paper considers osteoarthritic changes on vertebrae and major joints: shoulders, elbows, hips and knees. A joint was recorded as present if not less than one joint element was preserved or if over 50% of the joint surface was preserved in two or three elements.

Traumatic lesions are common abnormalities observed in skeletal populations (Grauer & Roberts 1996). Examination of trauma in individuals and patterns of trauma in populations can reveal a great deal about how individuals and societies interacted with one another and how their lifestyles influenced health and mortality (Kilgore et al. 1997). For the needs of this paper, traumas were defined as fractures of the bones which result due to forceful impact or contact with sharp or hard, blunt objects. The presence of traumas was established by macroscopic analysis which includes verification of the bilateral asymmetry of bones, angular deformities, presence of bone calluses and depressions on the skull. The head was included in the analysis only if all bones of the cranium and face were preserved. The postcranial skeleton was included in the analysis only if the analysed bones (clavicle, humerus, radius, ulna, femur, tibia, and fibula) had at least two thirds of their diaphysis and both joint surfaces preserved.

Some of the described diseases (e. g. dental diseases) are age-dependent (i. e. their frequency increases with advanced age). Therefore, when tabulating the data, age was controlled by dividing the sample into two broad categories: young adults (individuals aged between 16 and 35 years) and old adults (individuals older than 36 years).

The majority of the data gathered by the bioarchaeological analysis of the late Antique skeletal samples from Croatia does not have a normal distribution; therefore, for the determination of the statistical significance of the differences of the obtained results non-parametric methods were used. The differences in the average age-at-death for males and females and between the analysed samples were evaluated using the non-parametric Kruskal – Wallis test. The differences in the frequencies of the subadult stress markers, dental pathologies, infectious diseases, bone traumas and markers of hard physical labour between the complete samples, between subadults and adults, and between males and females were evaluated with the χ^2 test using Yates correction when appropriate. A statistical computer program SPSS 10.0 for Windows was used for all statistical calculations and tests.

RESULTS

Because graves from prior campaigns were described in Šlaus et al. (2004a), only graves excavated during 2002 or later are described in this article. The results of bioarchaeological analyses by grave and each individual skeleton unit are as follows:

Grave 51, 2002

Taphonomy: the bones are excellently preserved, dark in colour with slight postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 36 and 40 years based.

Pathological features: Schmorl's nodes are present on T6, T7, T8, T9, T11, T12, L2 and L3. Hypoplastic defects are present on the crowns of the maxillary central incisors, and on the maxillary and mandibular canines.

Grave 52, 2002

Taphonomy: the bones are excellently preserved, dark in colour with slight postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 41 and 45 years.

Pathological features: Schmorl's nodes are present on T8-T12, L1 and L2. Slight healed ectocranial porosity is present on both parietal bones and on the occipital bone. An antemortem, well healed depression fracture is present on the left parietal bone; the fracture is elongated, 10x5 mm in size with well remodelled edges. Slight degenerative osteoarthritic changes (osteophytes) are present on the left shoulder, both knees, L3 and L4. Slight healed periostitis is present on the proximal halves of both tibiae.

Grave 54, 2002

Taphonomy: the bones are well preserved, dark in colour with slight postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 36 and 40 years.

Pathological features: Schmorl's node is present on T11. Hypoplastic defects are present on the crowns of the maxillary central incisors, and on the maxillary and mandibular canines.

Grave 55, 2002

Taphonomy: the bones are poorly preserved, dark in colour with slight postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the skull, 2) innominate.

Age at death: between 36 and 40 years.

Pathological features: slight healed periostitis is present on the proximal halves of the left tibia and fibula.

Grave 56, 2002

Taphonomy: the bones are excellently preserved, dark in colour with slight postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 31 and 35 years.

Pathological features: slight healed periostitis is present on the proximal half of the right tibia. Hypoplastic defects are present on the crowns of the maxillary central incisors, and on the maxillary and mandibular canines.

Grave 57, 2002

Taphonomy: the bones are excellently preserved, dark in colour with slight postmortem damage to the cortex.

Sex: female, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 36 and 40 years.

Pathological features: slight degenerative osteoarthritic changes (osteophytes) are present on T9, T10, T12 and L4. Hypoplastic defects are present on the crowns of the mandibular canines.

Grave 58, 2002

Taphonomy: the bones are well preserved, dark in colour with slight postmortem damage to the cortex.

Sex: this is a subadult.

Age at death: between 3.5 and 4.5 years.

Pathological features: slight healed periostitis is present on the proximal halves of both tibiae.

Grave 59, 2002

Taphonomy: the bones are poorly preserved, dark in colour with slight postmortem damage to the cortex.

Sex: female, based on the gracility of long bones.

Age at death: between 31 and 35 years.

Pathological features: not present in the preserved material.

Grave 60, 2002

Taphonomy: the bones are poorly preserved, dark in colour with slight postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the skull, 2) robusticity of long bones.

Age at death: between 51 and 55 years.

Pathological features: slight degenerative osteoarthritic changes (osteophytes) are present on L5.

Grave 61, 2004

Taphonomy: the bones are poorly preserved, dark in colour with slight postmortem damage to the cortex.

Sex: indeterminable, due to the poor preservation of the remains.

Age at death: this is an adult.

Pathological features: not present in the preserved material.

Grave 62, 2003

Taphonomy: the bones are excellently preserved, dark in colour with slight postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 41 and 45 years.

Pathological features: slight healed cribra orbitalia is present in both orbits. Hypoplastic defects are present on the crowns of the maxillary and mandibular canines.

Grave 63, 2003

Taphonomy: the bones are well preserved, dark in colour with slight postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 36 and 40 years.

Pathological features: Schmorl's nodes are present on T8, T10 and L1. Hypoplastic defects are present on the crowns of the maxillary central incisors and canines.

Grave 64, 2003

Taphonomy: the bones are poorly preserved, dark in colour with slight postmortem damage to the cortex.

Sex: this is a subadult.

Age at death: between 5.5 and 6.5 years.

Pathological features: severe active porotic hyperostosis is present on the frontal bone, both parietal bones and the occipital bone. Moderate active cribra orbitalia is present in both orbits.

Grave 65, 2004

Taphonomy: the bones are poorly preserved, dark in colour with slight postmortem damage to the cortex.

Sex: this is a subadult.

Age at death: between 6 and 10 years.

Pathological features: not present in the preserved material.

Grave 67, 2004

Taphonomy: the bones are poorly preserved, dark in colour with slight postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the skull, 2) innominate.

Age at death: between 41 and 50 years.

Pathological features: slight degenerative osteoarthritic changes (osteophytes) are present on the left hip.

Grave 68, 2004

Taphonomy: the bones are poorly preserved, dark in colour with moderate postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 46 and 55 years.

Pathological features: not present in the preserved material.

Grave 69, 2004

Taphonomy: the bones are excellently preserved, dark in colour with slight postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 36 and 40 years.

Pathological features: ankylosis of the 2nd and 3rd cuneiform and navicular bone of the right foot is present. Slight active periostitis is present on the left side of the maxilla. Slight degenerative osteoarthritic changes (osteophytes) are present on the right shoulder, both hips and both knees.

Tomb 70, individual A, 2004

Taphonomy: the bones are well preserved, dark in colour with slight postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the skull, 2) innominate.

Age at death: between 31 and 35 years.

Pathological features: slight degenerative osteoarthritic changes (osteophytes) are present on the right hip, both knees and both distal tibiae.

Tomb 70, individual B, 2004

Taphonomy: the bones are poorly preserved, dark in colour with slight postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the innominate, 2) robusticity of long bones.

Age at death: between 15 and 18 years.

Pathological features: hypoplastic defects are present on the crowns of the maxillary canines.

Tomb 71, 2004

Taphonomy: the bones are poorly preserved, dark in colour with slight postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the innominate, 2) gracility of long bones.

Age at death: between 46 and 50 years.

Pathological features: slight degenerative osteoarthritic changes (osteophytes) are present on the left shoulder, both distal radii and the right hip. Moderate degenerative osteoarthritic changes (osteophytes) are present on the left knee.

Grave 72, 2004

Taphonomy: the bones are poorly preserved, dark in colour with slight postmortem damage to the cortex.

Sex: probably male, based on: 1) morphology of the mandible, 2) robusticity of long bones.

Age at death: between 31 and 40 years.

Pathological features: severe active periostitis is present on the right humerus and proximal halves of both femora. Slight degenerative osteoarthritic changes (osteophytes) are present on the left knee.

Tomb 73, 2004

Taphonomy: the bones are poorly preserved, dark in colour with slight postmortem damage to the cortex.

Sex: female, based on: 1) morphology of the innominate, 2) gracility of long bones.

Age at death: between 46 and 50 years.

Pathological features: slight degenerative osteoarthritic changes (osteophytes) are present on both elbows and both hips. Slight degenerative osteoarthritic changes (porosity) are present on the right shoulder. Moderate degenerative osteoarthritic changes (osteophytes) are present on L4 and L5. Spondylolysis is present on L5.

Tomb 74, individual A, 2004

Taphonomy: the bones are poorly preserved, dark in colour with slight postmortem damage to the cortex.

Sex: male, based on robusticity of long bones.

Age at death: between 36 and 40 years.

Pathological features: slight degenerative osteoarthritic changes (osteophytes) are present on elbows, the right distal radius, the right knee and T11, L1 and L5. A well-healed fracture is present on the middle third of the right ulna; the bone exhibits a callus measuring 24x12 mm, but there are no signs of infection.

Tomb 74, individual B, 2004

Taphonomy: the bones are poorly preserved, dark in colour with slight postmortem damage to the cortex.

Sex: this is a subadult.

Age at death: between 3 and 4 years.

Pathological features: not present in the preserved material.

Grave 75, individual A, 2004

Taphonomy: the bones are well preserved, dark in colour with slight postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the skull, 2) innominate.

Age at death: between 51 and 55 years.

Pathological features: a well-healed fracture is present on the right nasal bone; the bone exhibits a fracture line measuring 9 mm and slight lateral angulation. Slight degenerative osteoarthritic changes (osteophytes) are present on the right shoulder, both elbows, both hips, both knees, both ankles, L3 and L4. Moderate degenerative osteoarthritic changes (osteophytes) are present on T3. Ankylosis and severe degenerative osteoarthritic changes (osteophytes) are present on T6, T7, T8, T11 and T12.

Grave 75, individual B, 2004

Taphonomy: the bones are poorly preserved, dark in colour with slight postmortem damage to the cortex.

Sex: probably male, based on morphology of the skull.

Age at death: between 36 and 45 years.

Pathological features: slight healed cribra orbitalia is present in both orbits.

Grave 79, 2004

Taphonomy: the bones are moderately well preserved, dark in colour with slight postmortem damage to the cortex.

Sex: female, based on: 1) morphology of the skull, 2) innominate.

Age at death: between 31 and 35 years.

Pathological features: hypoplastic defects are present on the crowns of the maxillary incisors.

Grave 80, 2004

Taphonomy: the bones are excellently preserved, dark in colour with slight postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 21 and 25 years.

Pathological features: Schmorl's nodes are present on T6, T7, T8, T10 and T11. Hypoplastic defects are present on the crowns of the mandibular canines.

Grave 81, 2004

Taphonomy: the bones are excellently preserved, dark in colour with slight postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 51 and 55 years.

Pathological features: a well-healed fracture is present on the right nasal bone; the bone exhibits a callus measuring 5x10 mm and slight medial angulation. Traumatic myositis ossificans measuring 65x34 mm is present on the distal half of the right femur. Slight degenerative osteoarthritic changes (osteophytes) are present on both shoulders, both wrists, both hips, both ankles, T2, T6-T12 and L1-L5. Moderate degenerative osteoarthritic changes (osteophytes) are present on both knees, C7, T1, T9 and T10. Severe degenerative osteoarthritic changes (eburnation) are present on T1, T3, T4 and T5. Spondylolysis is present on L5.

Grave 82, 2004

Taphonomy: the bones are excellently preserved, dark in colour with slight postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 31 and 35 years.

Pathological features: slight healed cribra orbitalia is present in both orbits. Slight degenerative osteoarthritic changes (osteophytes) are present on both knees and L4. Schmorl`s nodes are present on T11, T12 and L2.

Grave 83, 2004

Taphonomy: the bones are moderately well preserved, dark in colour with slight postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the innominate, 2) robusticity of long bones.

Age at death: between 51 and 55 years.

Pathological features: slight degenerative osteoarthritic changes (osteophytes) are present on the left elbow, both hips, the right knee. Moderate healed periostitis is present on proximal halves of both tibiae and the right fibula.

Tomb 85, 2005

Taphonomy: the bones are poorly preserved, dark in colour with slight postmortem damage to the cortex.

Sex: male, based on robusticity of long bones.

Age at death: this is an adult.

Pathological features: not present in the preserved material.

Grave 86, 2004

Taphonomy: the bones are moderately well preserved, dark in colour with moderate postmortem damage to the cortex.

Sex: this is a subadult.

Age at death: between 12 and 13 years.

Pathological features: slight healed cribra orbitalia is present in both orbits. Slight healed periostitis is present on proximal half of the left tibia.

Grave 87, 2004

Taphonomy: the bones are excellently preserved, dark in colour with slight postmortem damage to the cortex.

Sex: female, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 26 and 30 years.

Pathological features: slight degenerative osteoarthritic changes (osteophytes) are present on T12. Schmorl's nodes are present on T7-T12, L1 and L2. Spondylolysis is present on L5.

Grave 88, 2004

Taphonomy: the bones are excellently preserved, dark in colour with slight postmortem damage to the cortex.

Sex: female, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 26 and 30 years.

Pathological features: degenerative osteoarthritic changes (osteophytes) are present on T4, T5 and T6. Schmorl's nodes are present on T6-T12, L1 and L2. Hypoplastic defects are present on the crowns of the maxillary incisors, and on the maxillary and mandibular canines.

Grave 90, 2004

Taphonomy: the bones are moderately well preserved, dark in colour with slight postmortem damage to the cortex.

Sex: female, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 36 and 40 years.

Pathological features: slight degenerative osteoarthritic changes (osteophytes) are present on the right shoulder, the right hip, the right knee, T6, T7 and T8.

Grave 92, 2004

Taphonomy: the bones are excellently preserved, dark in colour with slight postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 36 and 40 years.

Pathological features: slight degenerative osteoarthritic changes (osteophytes) are present on the left wrist, both hips, both knees, both ankles, C3, T7, T8, T9, L1 and L3. Severe degenerative osteoarthritic changes (osteophytes and eburnation) are present on the right wrist. Schmorl's nodes are present on T7-T12. Superior plate fracture is present on L3. Moderate active periostitis is present on the distal halves of both radii, both tibiae and the right fibula. Ankylosis of the first and second phalangae of the first toe of the right foot is present.

Grave 93, 2005

Taphonomy: the bones are excellently preserved, dark in colour with slight postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 36 and 40 years.

Pathological features: slight degenerative osteoarthritic changes (osteophytes) are present on both elbows, both hips, both knees and both ankles. Slight active periostitis is present on the distal halves of both tibiae and both fibulae. Otitis media is present on both temporal bones. Hypoplastic defects are present on the crowns of the mandibular canines.

Grave 94, 2005

Taphonomy: the bones are moderately well preserved, dark with slight postmortem damage to the cortex.

Sex: this is a subadult.

Age at death: between 8.5 and 9.5 years.

Pathological features: severe active cribra orbitalia is present in both orbits.

Grave 95, individual A, 2004

Taphonomy: the bones are well preserved, dark in colour with slight postmortem damage to the cortex.

Sex: female, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 36 and 40 years.

Pathological features: slight degenerative osteoarthritic changes (osteophytes) are present on the left shoulder, both wrists, both hips and both knees. Schmorl's node is present on L2. Hypoplastic defects are present on the crowns of the maxillary and mandibular canines.

Grave 95, individual B, 2004

Taphonomy: the bones are excellently preserved, yellowish in colour with slight postmortem damage to the cortex (**Figure 2**).

Sex: this is a subadult.

Age at death: between 0 and 0.5 year.

Figure 2. Excellently preserved skeleton of a subadult aged between 0 and 0.5 years. Štrbinci, grave 95, individual B (photo by V. Vyroubal, 2005).

Pathological features: slight active periostitis is present on the right clavicle.

Tomb 96, 2004

Taphonomy: the bones are poorly preserved, dark in colour with slight postmortem damage to the cortex.
Sex: female, based on gracility of long bones.
Age at death: between 31 and 35 years.
Pathological features: not present in the preserved material.

Grave 97, 2004

Taphonomy: the bones are poorly preserved, dark in colour with slight postmortem damage to the cortex.
Sex: female, based on gracility of long bones.
Age at death: between 31 and 40 years.
Pathological features: not present in the preserved material.

Tomb 98, 2004

Taphonomy: the bones are poorly preserved, dark in colour with slight postmortem damage to the cortex.
Sex: female, based on gracility of long bones.

Age at death: between 36 and 45 years.

Pathological features: slight degenerative osteoarthritic changes (osteophytes) are present on the right hip.

Grave 99, 2004

Taphonomy: the bones are excellently preserved, dark in colour with slight post-mortem damage to the cortex.

Sex: female, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 31 and 35 years.

Pathological features: slight degenerative osteoarthritic changes (osteophytes) are present on both shoulders, both hips and both knees.

Grave 100, 2005

Taphonomy: the bones are excellently preserved, dark in colour with slight post-mortem damage to the cortex.

Sex: female, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 51 and 55 years.

Pathological features: slight degenerative osteoarthritic changes (osteophytes) are present on the left shoulder, both knees and both ankles. Moderate degenerative osteoarthritic changes (porosity) are present on C3 and C4.

Grave 101, 2005

Taphonomy: the bones are excellently preserved, dark in colour with slight post-mortem damage to the cortex.

Sex: female, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 46 and 50 years.

Pathological features: slight degenerative osteoarthritic changes (osteophytes) are present on both shoulders, both hips, T6-T12. Slight degenerative osteoarthritic changes (porosity) are present on the left elbow, T1, T2, T3 and T4. Schmorl's nodes are present on T7, L2 and L3. Slight healed cribra orbitalia is present in both orbits. Slight healed periostitis is present on the right tibia and the right fibula. Hypoplastic defects are present on the crowns of the maxillary and mandibular canines.

Grave 102, 2004

Taphonomy: the bones are well preserved, dark in colour with severe postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 31 and 35 years.

Pathological features: slight active periostitis is present on the right side of the maxilla and distal halves of both tibiae. Hypoplastic defects are present on the crowns of the maxillary incisors.

Grave 103, 2004

Taphonomy: the bones are excellently preserved, dark in colour with slight post-mortem damage to the cortex.

Sex: female, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 41 and 45 years.

Pathological features: slight degenerative osteoarthritic changes (osteophytes) are present on both shoulders, both hips, both knees, C4, C5, T3, T7-T12, L1 and L5. Moderate degenerative osteoarthritic changes (osteophytes) are present on L1, L2, L3 and L4. Schmorl's nodes are present on L2, L3 and L4. Ankylosis of T12 and L1 is present. Hypoplastic defects are present on the crowns of the maxillary incisors, and on the maxillary and mandibular canines.

Grave 104, 2005

Taphonomy: the bones are poorly preserved, dark in colour with slight postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the innominate, 2) robusticity of long bones.

Age at death: between 41 and 45 years.

Pathological features: slight degenerative osteoarthritic changes (osteophytes) are present on both knees, both ankles and L1. Moderate degenerative osteoarthritic changes (osteophytes) are present on T11, T12 and L2. Slight active periostitis is present on the distal half of the right tibia. Slight healed periostitis is present on the distal half of the left tibia.

Grave 105, 2005

Taphonomy: the bones are well preserved, dark in colour with slight postmortem damage to the cortex.

Sex: female, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 36 and 40 years.

Pathological features: slight healed periostitis is present on the proximal halves of both tibiae.

Grave 106, 2005

The remains of a subadult and an adult are present in the preserved material.

Grave 107, 2005

Taphonomy: the bones are well preserved, dark in colour with slight postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the innominate, 2) robusticity of long bones.

Age at death: between 36 and 40 years.

Pathological features: slight healed cribra orbitalia is present in both orbits. Slight healed periostitis is present on both tibiae and the left fibula. Hypoplastic defects are present on the crowns of the maxillary incisors, and on the maxillary and mandibular canines.

Grave 108, 2005

Taphonomy: the bones are well preserved, dark in colour with slight postmortem damage to the cortex.

Sex: female, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 36 and 40 years.

Pathological features: slight degenerative osteoarthritic changes (osteophytes) are present on the left knee. Hypoplastic defects are present on the crowns of the maxillary incisors.

Tomb 109, 2005

Taphonomy: the bones are poorly preserved, dark in colour with slight postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the innominate, 2) robusticity of long bones.

Age at death: between 36 and 45 years.

Pathological features: slight degenerative osteoarthritic changes (osteophytes) are present on the left hip and the left knee. Slight healed periostitis is present on the left tibia.

Grave 110, 2005

Taphonomy: the bones are well preserved, dark in colour with moderate postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the skull, 2) innominate.

Age at death: between 15 and 17 years.

Pathological features: Schmorl's nodes are present on T5 and T6. Hypoplastic defects are present on the crowns of the maxillary and mandibular canines.

Grave 112, 2005

Taphonomy: the bones are well preserved, dark in colour with slight postmortem damage to the cortex.

Sex: this is a subadult.

Age at death: between 3.5 and 4.5 years.

Pathological features: not present in the preserved material.

Grave 113, individual A, 2005

Taphonomy: the bones are excellently preserved, dark in colour with slight postmortem damage to the cortex.

Sex: female, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 41 and 45 years.

Pathological features: slight degenerative osteoarthritic changes (osteophytes) are present on C5, C6, C7, T1, T7, T8, T9, T10, and L1-L5. Slight lateral epicondylitis is present on the right elbow. Hypoplastic defects are present on the crowns of the mandibular canines.

Grave 113, individual B, 2005

Taphonomy: the bones are well preserved, dark in colour with slight postmortem damage to the cortex. Traces of metal oxidation are present on both ulnae, radii, the right humerus and three cervical vertebrae.

Sex: this is a subadult.

Age at death: between 12 and 14 years.

Pathological features: not present in the preserved material.

Grave 115, 2005

Taphonomy: the bones are poorly preserved, dark in colour with severe damage to the cortex.

Sex: this is a subadult.

Age at death: between 11 and 15 years.

Pathological features: not present in the preserved material.

Grave 117, 2007

Taphonomy: the bones are moderately well preserved, dark in colour with moderate postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the mandible, 2) innominate.

Age at death: between 41 and 45 years based.

Pathological features: Schmorl's nodes are present on T11 and T12. Slight degenerative osteoarthritic changes (osteophytes) are present on both elbows and the right knee.

Grave 118, 2007

Taphonomy: the bones are excellently preserved, dark in colour with slight damage to the cortex.

Sex: this is a subadult.

Age at death: between 3.5 and 4.5 years.

Pathological features: slight healed periostitis is present on the proximal half of the left tibia.

Grave 119, 2007

Taphonomy: the bones are excellently preserved, dark in colour with slight damage to the cortex. Traces of metal oxidation are present on the frontal bone.

Sex: this is a subadult.

Age at death: between 4 and 5 years.

Pathological features: slight active cribra orbitalia is present in the left orbit.

Grave 120, 2007

Taphonomy: the bones are excellently preserved, dark in colour with slight damage to the cortex.

Sex: this is a subadult.

Age at death: between 10.5 and 11.5 years.

Pathological features: not present in the preserved material.

Grave 121, individual A, 2007

Taphonomy: the bones are excellently preserved, dark in colour with slight postmortem damage to the cortex. Traces of metal oxidation are present on both radii and both ulnae.

Sex: female, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 51 and 55 years.

Pathological features: slight healed cribra orbitalia is present in both orbits. Slight degenerative osteoarthritic changes (osteophytes) are present on the left elbow, both hips, both knees, C4, C7, L2, L3 and L4.

Grave 121, individual B, 2007

Taphonomy: the bones are poorly preserved, dark in colour with severe damage to the cortex.

Sex: this is a subadult.

Age at death: between 3 and 4 years.

Pathological features: slight healed periostitis is present on the proximal half of the left femur.

Grave 122, 2007

Taphonomy: the bones are excellently preserved, dark in colour with slight postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 51 and 55 years.

Pathological features: slight degenerative osteoarthritic changes (osteophytes) are present on both shoulders and the right elbow. Moderate degenerative osteoarthritic changes (osteophytes and porosity) are present on C3-C7 and T1-T4. Severe degenerative osteoarthritic changes (osteophytes and eburnation) are present on both hips. Schmorl's nodes are present on T6-T12 and L1-L5. Severe active osteomyelitis with severe active periostitis is present on both tibiae and fibulae which resulted in ankylosis of both tibiae and fibulae on the distal ends. Well healed fracture with shallow remodelled fracture line is present on the inferior side of the proximal joint surface of the left talus.

Grave 123, 2007

Taphonomy: the bones are moderately well preserved, dark in colour with moderate postmortem damage to the cortex.

Sex: female, based on: 1) morphology of the mandible, 2) innominate.

Age at death: between 41 and 45 years.

Pathological features: not present in the preserved material.

Grave 124, 2007

Taphonomy: the bones are poorly preserved, dark in colour with moderate postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the skull, 2) mandible.

Age at death: between 26 and 30 years.

Pathological features: slight healed cribra orbitalia is present in both orbits. Hypoplastic defects are present on the crowns of the mandibular canines.

Grave 125, 2007

Taphonomy: the bones are poorly preserved, dark in colour with severe damage to the cortex. Traces of metal oxidation are present on both elbows and both clavicles.

Sex: this is a subadult.

Age at death: between 10 and 11 years.

Pathological features: not present in the preserved material.

Grave 126, 2007

Taphonomy: the bones are moderately well preserved, dark in colour with moderate damage to the cortex. Traces of metal oxidation are present on both radii and both ulnae, the right maxilla and metacarpal bones.

Sex: this is a subadult.

Age at death: between 14 and 15 years.

Pathological features: not present in the preserved material.

Grave 127, 2007

Taphonomy: the bones are excellently preserved, dark in colour with slight post-mortem damage to the cortex.

Sex: male, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 51 and 55 years.

Pathological features: slight degenerative osteoarthritic changes (osteophytes) are present on both elbows, both hips and both knees. Severe degenerative osteoarthritic changes (osteophytes, eburnation and porosity) are present on C3, C4, C5, and C6. Hypoplastic defects are present on the crowns of the mandibular canines.

Grave 129, 2007

Taphonomy: the bones are excellently preserved, dark in colour with slight post-mortem damage to the cortex.

Sex: male, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 36 and 40 years.

Pathological features: slight degenerative osteoarthritic changes (osteophytes) are present on the left knee. Schmorl's nodes are present on T6, T8, T9, T10, T12, L2, and L4. Ossified subperiosteal haematoma is present on the medial side of the middle third of the left tibia. Hypoplastic defects are present on the crowns of the maxillary central incisors, and on the maxillary and mandibular canines.

Grave 131, 2007

Taphonomy: the bones are excellently preserved, dark in colour with slight postmortem damage to the cortex. Traces of metal oxidation are present on the left hip, both radii and both ulnae.

Sex: female, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 21 and 25 years.

Pathological features: slight healed cribra orbitalia is present in the right orbit. Slight healed periostitis is present on both tibiae. Hypoplastic defects are present on the crowns of the mandibular canines.

Grave 132, 2007

Taphonomy: the bones are excellently preserved, dark in colour with slight postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 41 and 45 years.

Pathological features: slight degenerative osteoarthritic changes (osteophytes) are present on L4 and L5. Slight healed periostitis is present on both tibiae. Schmorl's node is present on T11. An antemortem, well healed depression fracture is present on the frontal bone, 52 m superior of nasion; the fracture oval-shaped, 6x3 mm in size with well remodelled edges and very shallow. Hypoplastic defects are present on the crowns of the maxillary central incisors, and on the maxillary and mandibular canines.

Grave 133, 2007

Taphonomy: the bones are excellently preserved, dark with slight postmortem damage to the cortex.

Sex: female, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 31 and 35 years.

Pathological features: slight healed periostitis is present on both innominates. Slight active periostitis is present on both tibiae, both fibulae and both calcaneii.

Grave 134, 2007

Taphonomy: the bones are poorly preserved, dark in colour with severe postmortem damage to the cortex. Traces of metal oxidation are present on the frontal bone, the occipital bone and the right clavicle.

Sex: this is a subadult.

Age at death: between 2 and 3 years.

Pathological features: not present in the preserved material.

Grave 135, 2007

Taphonomy: the bones are moderately well preserved, dark in colour with moderate postmortem damage to the cortex. Traces of metal oxidation are present on carpal and metacarpal bones.

Sex: male, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 41 and 45 years.

Pathological features: slight degenerative osteoarthritic changes (osteophytes) are present on T9 and T10. Slight healed periostitis is present on both tibiae.

Grave 136, individual A, 2007

Taphonomy: the bones are moderately well preserved, dark in colour with moderate postmortem damage to the cortex. Traces of metal oxidation are present on both radii and the right ulna.

Sex: female, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 36 and 40 years.

Pathological features: Schmorl's nodes are present on T7-T12. Hypoplastic defects are present on the crowns of the mandibular canines.

Grave 136, individual B, 2007

Taphonomy: the bones are poorly preserved, dark in colour with severe postmortem damage to the cortex.

Sex: female, based on: 1) morphology of the innominate, 2) gracility of the long bones.

Age at death: between 36 and 40 years.

Pathological features: ossified subperiosteal haematoma is present on the lateral side of the middle third of the left tibia.

Grave 137, 2007

Taphonomy: the bones are poorly preserved, dark in colour with severe postmortem damage to the cortex.

Sex: this is a subadult.

Age at death: between 10 and 11 years.

Pathological features: slight healed periostitis is present on the left tibia.

Grave 138, 2007

Taphonomy: the bones are excellently preserved, dark in colour with slight postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: over 60 years.

Pathological features: slight degenerative osteoarthritic changes (osteophytes) are present on the right shoulder, the left knee, T6, and T7. Moderate degenerative osteoarthritic changes (osteophytes and porosity) are present on the left elbow, both hips, C4-C7, T8-T12, L4, and L5. Severe degenerative osteoarthritic changes (osteophytes and eburnation) are present on the right knee and C3. An antemortem fracture is present on the distal joint surface of the right tibia; an irregular fracture line diagonally divides the joint surface in half and intersects on the proximal end. One hypoplastic defect is present on the crown of the maxillary canine.

Grave 139, 2007

Taphonomy: the bones are poorly preserved, dark in colour with severe postmortem damage to the cortex.

Sex: this is a subadult.

Age at death: between 6 and 10 years.

Pathological features: not present in the preserved material.

Grave 140, 2007

Taphonomy: the bones are well preserved, dark in colour with slight postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 46 and 50 years.

Pathological features: slight degenerative osteoarthritic changes (osteophytes and porosity) are present on C6, C7, and L3. Schmorl's node is present on L3. Slight healed periostitis is present on the left tibia. An antemortem fracture is present on the anterior side of the medial condyle of the left femur; the fracture line is 27 mm long. Hypoplastic defects are present on the crowns of the mandibular canines.

Grave 142, 2007

Taphonomy: the bones are excellently preserved, dark in colour with slight postmortem damage to the cortex.

Sex: female, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 41 and 45 years.

Pathological features: slight degenerative osteoarthritic changes (osteophytes) are present on both elbows, T10, and T11. Hypoplastic defects are present on the crowns of the maxillary and mandibular canines.

Grave 143, 2007

Taphonomy: the bones are poorly preserved, dark in colour with severe postmortem damage to the cortex.

Sex: male, based on the robusticity of the long bones.

Age at death: between 16 and 18 years.

Pathological features: not present in the preserved material.

Grave 144, 2007

Taphonomy: the bones are excellently preserved, dark in colour with slight postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 21 and 25 years.

Pathological features: slight healed periostitis is present on both tibiae. Schmorl's nodes are present on T4-T12 and L1-L5.

Grave 145, 2007

Taphonomy: the bones are poorly preserved, dark in colour with severe postmortem damage to the cortex. Traces of metal oxidation are present on the hand phalanxes.

Sex: male, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 56 and 60 years.

Pathological features: slight degenerative osteoarthritic changes (osteophytes) are present on both shoulders and the left knee. Severe degenerative osteoarthritic changes (osteophytes and eburnation) are present on both hips. Hypoplastic defects are present on the crowns of the maxillary central incisor and canine.

Grave 146, 2007

Taphonomy: the bones are poorly preserved, dark in colour with severe postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 46 and 50 years.

Pathological features: slight healed periostitis is present on the right tibia. Hypoplastic defects are present on the crowns of the maxillary central incisors, and on the maxillary and mandibular canines.

Grave 147, 2007

Taphonomy: the bones are excellently preserved, dark in colour with slight postmortem damage to the cortex.

Sex: male, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 26 and 30 years.

Pathological features: slight healed cribra orbitalia is present in both orbits. Slight healed periostitis is present on both femurs and both tibiae. Hypoplastic defects are present on the crowns of the maxillary and mandibular canines.

Grave 148, 2007

Taphonomy: the bones are well preserved, dark in colour with moderate postmortem damage to the cortex.

Sex: female, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 31 and 35 years.

Pathological features: slight healed cribra orbitalia is present in both orbits. Moderate active periostitis is present on both tibiae. Hypoplastic defects are present on the crowns of the maxillary central incisors, and on the maxillary and mandibular canines.

Grave 149, 2007

Taphonomy: the bones are moderately well preserved, dark in colour with moderate postmortem damage to the cortex. Traces of metal oxidation are present on the hand phalanxes.

Sex: male, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 41 and 45 years.

Pathological features: slight degenerative osteoarthritic changes (osteophytes) are present on the left shoulder, T7, T8, and T9. An antemortem well healed spiral fracture is present on the distal third of the right tibia; the fracture is manifested by a well remodelled callus, slight healed periostitis and two fracture lines on the distant joint surface of the right tibia. An antemortem well healed fracture is also present on the left clavicle; the fracture is manifested by well remodelled small callus without any signs of angulation. A dislocation of the left shoulder is present. The dislocation is most probably caused by an antemortem fracture of the left clavicle. Hypoplastic defects are present on the crowns of the mandibular canines.

Grave 150, 2007

Taphonomy: the bones are well preserved, dark in colour with moderate postmortem damage to the cortex. Traces of metal oxidation are present on both innominates.

Sex: male, based on: 1) morphology of the skull, 2) mandible, 3) innominate.

Age at death: between 31 and 35 years.

Pathological features: slight active periostitis is present on the left femur. Hypoplastic defects are present on the crowns of the maxillary and mandibular canines.

Table 1. Age and sex distribution in the Štrbinci skeletal sample

Age	Subadults	Females	Males
0-1	2		
2-5	10		
6-10	13		
11-15	9		
16-20			3
21-25		1	5
26-30		5	4
31-35		11	6
36-40		11	12
41-45		10	14
46-50		4	6
51-55		2	8
56-60			1
60+			2
Total	**34**	**44**	**61**
Mean age at death[1]		x=37.0 (sd=6.99)	x=39.0 (sd=10.85)

[1] The average age at death was calculated on the basis of the median value for each age group (e.g. 38 years for the age group 36-40) and 65 years for the age group 60+.

The sex- and age-based distribution of mortality for the Štrbinci and the Zadar – Relja samples is shown in **Tables 1 and 2**. The Štrbinci sample consists of 139 individuals (only individuals with unambiguous determination of sex and age are included) of whom 34 are subadults (24.5%), 44 are females (31.6%) and 61 are males (43.9%). The sample from the Zadar – Relja is larger, and consists of 255 individuals of whom 64 are subadults (25.1%), 80 are females (31.4%) and 111 are males (43.5%). In both samples the ratio between males and females is identical: 1.00: 0.72. Both analysed samples contain a small proportion of subadults: in Štrbinci subadult skeletons account for 24.5% of the total sample and in Zadar subadult skeletons account for 25.1% of the total sample.

The highest subadult mortality in the Štrbinci skeletal sample was recorded in the period between six and ten years of age (13/139 or 9.3% of the entire sample), while in the Zadar – Relja sample the highest subadult mortality was recorded in the period between two and five years of age (21/255 or 8.2% of the entire sample) (**Chart**

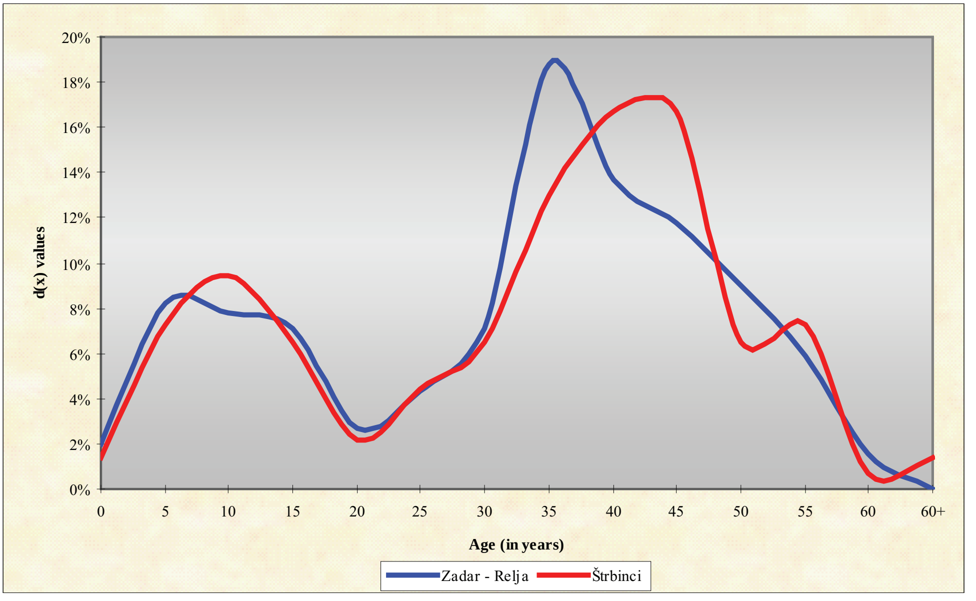

Chart 1. d(x) values for the complete Štrbinci and Zadar – Relja skeletal samples (M. Novak, 2008).

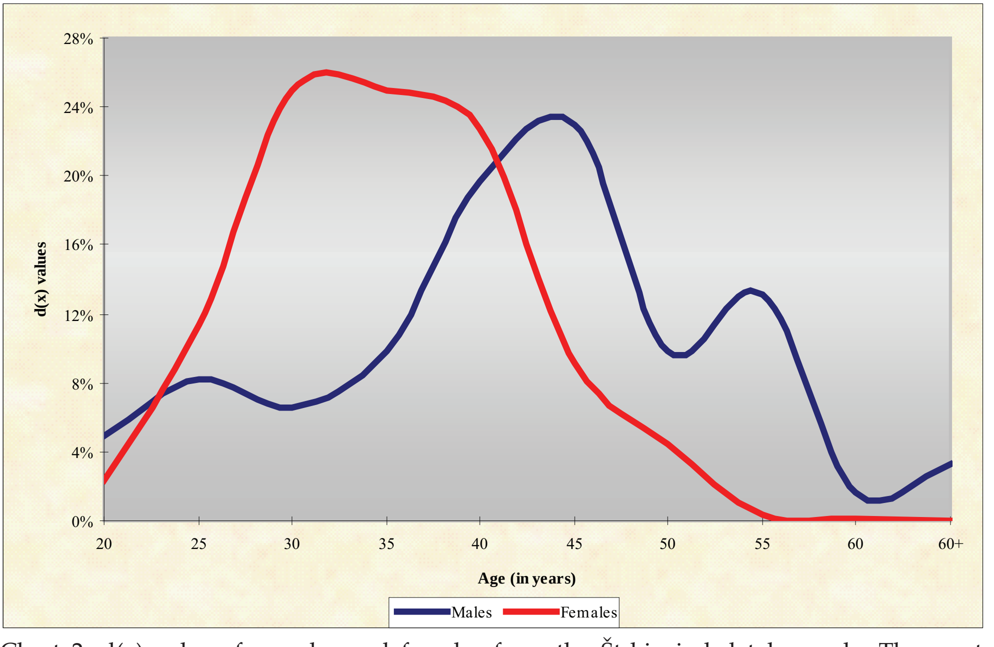

Chart 2. d(x) values for males and females from the Štrbinci skeletal sample. The most pronounced difference is present in the 31-35 years age category (M. Novak, 2008).

1). In both samples, the mortality of subadults between birth and one year of age is very low: in Štrbinci 1.4% of the entire sample (2/139) and in Zadar – Relja 2.0% of the entire sample (5/255).

Table 2. Age and sex distribution in the Zadar – Relja skeletal sample

Age	**Subadults**	**Females**	**Males**
0-1	5		
2-5	21		
6-10	20		
11-15	18		
16-20		2	5
21-25		6	5
26-30		12	6
31-35		19	29
36-40		11	24
41-45		12	18
46-50		9	14
51-55		9	6
56-60		0	4
60+		0	0
Total	**64**	**80**	**111**
Mean age at death[1]		x=37.4 (sd=9.43	x=38.4 (sd=9.29)

[1] The average age at death was calculated on the basis of the median value for each age group (e.g. 38 years for the age group 36-40) and 65 years for the age group 60+.

In the Štrbinci sample males exhibited somewhat longer average life span than females (39.0 years vs. 37.0 years), but this difference is not statistically significant. Similar situation was observed in the Zadar – Relja sample where the average age-at-death for males was 38.4 years and for females 37.4 years, but again, without statistically significant difference between the sexes.

The highest female mortality rate in the Štrbinci sample appears between the ages of 31 and 35, and between 36 and 40, when 25.0% of the females died (**Chart 2**), while in the Zadar – Relja sample the highest female mortality rate appears between the ages of 26 and 30, and between 41 and 45, when 15.0% of the females died. In the Štrbinci sample highest mortality among males occurred between the ages of 41 and 45, when 23.0% of the males died, while among males from the Zadar – Relja sample the highest mortality occurred between the ages of 31 and 35, when 26.1% of the males died.

Table 3. Frequency of alveolar bone disease in the Štrbinci skeletal sample

	Subadults		Females		Males	
	A[1]/O[2]	%	A/O	%	A/O	%
Young adult			21/362	5.8	6/367	1.6
Old adult			46/498	9.2	87/898	9.7
Total	**1/355**	**0.4**	**67/860**	**7.8**	**93/1265**	**7.3**

A[1] = number of tooth sockets with periodontal or periapical abscess, or antemortem tooth loss.
O[2] = number of tooth sockets observed.

Table 4. Frequency of alveolar bone disease in the Zadar – Relja skeletal sample

	Subadults		Females		Males	
	A[1]/O[2]	%	A/O	%	A/O	%
Young adult			9/811	1.1	19/782	2.4
Old adult			136/885	15.4	107/1035	10.3
Total	**0/796**	**0.0**	**145/1696**	**8.5**	**126/1817**	**6.9**

A[1] = number of tooth sockets with periodontal or periapical abscess, or antemortem tooth loss.
O[2] = number of tooth sockets observed.

The frequencies of alveolar bone disease in the Štrbinci and Zadar – Relja samples are shown in **Tables 3 and 4**. In both samples, alveolar bone disease is exceptionally rare among subadults: in the Štrbinci sample only one case of alveolar bone disease among subadults was observed (0.4% or 1/355), while in the Zadar – Relja sample not one case of alveolar abscess or antemortem tooth loss (0/796) was noted. The overall frequency of alveolar bone disease among adults in Štrbinci is 7.5% (160/2125) and in Zadar 7.7% (271/3513) with no statistical differences between the analysed samples. Also, there are no statistically significant differences between sexes in both analysed skeletal series: in Štrbinci the frequency of alveolar bone disease in males is 7.3%, and in females 7.8%, while in Zadar this frequency for males is 6.9% and for females 8.5%. A considerable increase in alveolar bone disease among older individuals is clearly visible in both samples. For individuals aged 16 to 35, the frequency of alveolar bone disease is 3.7% (27/729) in Štrbinci, and 1.8% (28/1593) in Zadar, while for individuals over 35 years of age this frequency in both samples is much higher: 9.5% (133/1396) in Štrbinci and 12.6% (243/1920) in Zadar. In both samples the difference between "young" and "old" individuals is statistically significant: in Štrbinci it is $\chi^2 = 22.498$; $P < 0.001$, while in Zadar it is $\chi^2 = 143.375$; $P < 0.001$.

Table 5. Frequency of carious lesions in the Štrbinci skeletal sample

	Subadults		Females		Males	
	A[1]/O[2]	%	A/O	%	A/O	%
Young adult			18/331	5.4	24/399	6.0
Old adult			37/464	8.0	80/799	10.3
Total	**5/315**	**1.6**	**55/827**	**6.9**	**100/1178**	**8.8**

A[1] = number of teeth with carious lesions.
O[2] = number of teeth observed.

Table 6. Frequency of carious lesions in the Zadar – Relja skeletal sample

	Subadults		Females		Males	
	A[1]/O[2]	%	A/O	%	A/O	%
Young adult			14/613	2.3	32/726	4.4
Old adult			59/664	8.9	34/746	4.5
Total	**6/678**	**0.9**	**73/1277**	**5.9**	**66/1472**	**4.5**

A[1] = number of teeth with carious lesions.
O[2] = number of teeth observed.

The frequencies of dental caries in the Štrbinci sample and in the Zadar – Relja sample are shown in **Tables 5 and 6**. The frequency of caries among subadults (deciduous and permanent teeth combined) in both samples is very low: in Štrbinci 1.6% (5/315) and in Zadar 0.9% (6/678). The overall frequency of carious lesions among adults is significantly higher in Štrbinci (7.7% or 155/2005) than in Zadar (5.1% or 139/2749) and it is $\chi^2 = 13.834$; $P < 0.001$. Analysis by sex shows no significant difference in the frequency of caries between males and females in both samples: in Štrbinci males suffered from caries more frequently than females (8.8% vs. 6.9%), while in Zadar females exhibited somewhat higher frequencies of carious lesions than males (5.9% vs. 4.5%).

The frequencies of linear enamel hypoplasia (LEH) in both samples are shown in **Tables 7 and 8**. The frequency is somewhat greater in the sample from Zadar in which LEH was observed in 61.1% of the analysed teeth (245/401), while in Štrbinci hypoplastic defects were present in 56.9% of the analysed teeth (115/202). This difference is not statistically significant. In Štrbinci LEH is most often recorded on the maxillary canines (60.1%), while in Zadar LEH is most often recorded on the mandibular canines (76.6%). In Štrbinci adult individuals without hipoplastic defects lived averagely 2.0 years longer than the individuals with LEH (39.7 vs. 37.7 years), but this difference is not statistically significant.

The frequencies of cribra orbitalia are shown in **Tables 9 and 10**. The overall frequency of cribra orbitalia among subadults in the Štrbinci sample is 37.5% (9/24). In six subadults, cribra orbitalia was active at the time of death (66.7%). For adults from Štrbinci, the frequency of cribra orbitalia is 20.1% (19/91) with a somewhat higher frequencies in males than in females (26.4% vs. 13.2%), but this difference is not statistically significant, probably due to relatively small analysed sample. The frequency of cribra orbitalia among subadults in Zadar (50.0%) is somewhat higher than in Štrbinci, but the difference is not statistically significant. Active cribra orbitalia is present in 16.7% (2/16) of the observed cases among subadults from Zadar. The frequency of this pathological change among adults is 10.3% (10/97), with very similar frequencies in males and females (9.4% and 11.4%). However, an analysis of cribra orbitalia frequency in the studied samples indicates one, very important difference. Namely, while the frequency cribra orbitalia among subadults and adults is very similar, the frequency of the *active* form of this pathology is essentially different. In Štrbinci, active cribra orbitalia was recorded in 66.7%, while in the Zadar only two cases of the active form (16.7%) were observed. This difference is statistically significant ($\chi^2 = 5.48$; $P = 0.0192$). The effect that the underlying anaemia causing cribra orbitalia had on the quality of life in Štrbinci can be gauged by the fact that adults with cribra orbitalia lived, on average, 5.9 years shorter than the individuals without cribra orbitalia (40.7 vs. 34.8 years). This difference is marginally non-significant ($\chi^2 = 3.688$; $P = 0.055$).

Table 7. Hypoplasia frequencies by individual in the Štrbinci skeletal sample

Tooth	N[1]	NwLEH	% wLEH
Maxillary I1[2]	56	29	51.8
Maxillary C	69	42	60.1
Mandibular C	77	44	57.1

N[1] = number of analyzed teeth; NwLEH=number of teeth with one or more case of LEH; % wLEH=% of N with one or more case of LEH;
I[2] = incisor; C=canine.

Table 8. Hypoplasia frequencies by individual in the Zadar – Relja skeletal sample

Tooth	N[1]	NwLEH	% wLEH
Maxillary I1[2]	119	54	45.4
Maxillary C	128	73	57.0
Mandibular C	154	118	76.6

N[1] = number of analyzed teeth; NwLEH=number of teeth with one or more case of LEH; % wLEH=% of N with one or more case of LEH;
I[2] = incisor; C=canine.

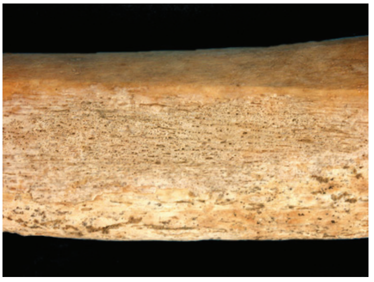

Figure 3. Slight active periostitis on the right tibia. Male, aged, between 31 and 35 years. Štrbinci, grave 102 (photo by V. Vyroubal, 2005).

The frequencies of non-specific periostitis in both analysed samples are shown in **Tables 11 and 12**. The overall frequency of periostitis in both analysed skeletal series is almost the same: in Štrbinci it is 42.7% (38/89) while in Zadar it is 47.1% (138/165). The frequency of periostitis among subadults in both samples is also very similar: in Štrbinci the frequency of periostitis among subadults is 61.5%, while in Zadar this frequency is 66.7%. Overall frequency of periostitis among adults in Štrbinci is 39.5% (30/76) with a somewhat higher frequency in males (**Figure 3**) than in females (44.4% vs. 32.3%), but without statistically significant differences. In Zadar, the frequency of periostitis among adults is almost identical to that in Štrbinci (40.2% or 41/102), with again, higher frequencies in males than in females (50.0% vs. 27.3%).

Figure 4. Severe degenerative osteoarthritis (osteophytes) on the 6th, 7th and 8th toracal vertebrae. Male, aged between 51 and 55 years. Štrbinci, grave 75, individual A (photo by V. Vyroubal, 2005).

Table 9. Frequency of cribra orbitalia in the Štrbinci skeletal sample

Age/sex	Cribra orbitalia			Active lesions	
	O[1]	A1[2]	%	A2[3]	% of A1
0 - 0.9	2	0	0.0	0	0.0
1 - 4.9	6	1	16.7	1	100.0
5 - 9.9	10	6	60.0	5	83.3
10 – 14.9	6	2	33.3	0	0.0
Subadults - total	**24**	**9**	**37.5**	**6**	**66.7**
Females	38	5	13.2	0	0.0
Males	53	14	26.4	0	0.0
Adults - total	**91**	**19**	**20.1**	**0**	**0.0**

O[1] = number of analyzed frontal bones;
A1[2] = number of frontal bones on which a minimum of one orbit shows signs of cribra orbitalia;
A2[3] = number of frontal bones on which cribra orbitalia was active at time of death.

Table 10. Frequency of cribra orbitalia in the Zadar – Relja skeletal sample

Age/sex	Cribra orbitalia			Active lesions	
	O[1]	A1[2]	%	A2[3]	% of A1
0 - 0.9	0	0	0.0	0	0.0
1 - 4.9	12	8	66.7	2	25.0
5 - 9.9	8	2	25.0	0	0.0
10 – 14.9	12	6	50.0	0	0.0
Subadults - total	**32**	**16**	**50.0**	**2**	**16.7**
Females	44	5	11.4	0	0.0
Males	53	5	9.4	0	0.0
Adults - total	**97**	**10**	**10.3**	**0**	**0,0**

O[1] = number of analyzed frontal bones;
A1[2] = number of frontal bones on which a minimum of one orbit shows signs of cribra orbitalia;
A2[3] = number of frontal bones on which cribra orbitalia was active at time of death.

The frequencies of Schmorl's nodes in both analysed samples are shown in **Tables 13 and 14**. The total frequency of Schmorl's nodes in the sample from Štrbinci is 16.4% (145/882), with statistically higher frequency in males (20.9%) than in females (11.1%) ($\chi^2 = 14.602$; $P < 0.001$). The overall frequency of Schmorl's nodes in the Zadar – Relja sample is 12.2% (205/1677), with, again, statistically higher frequency in males (16.2%) than in females (6.3%) ($\chi^2 = 35.58$; $P < 0.001$). Schmorl's nodes are much more frequent in Štrbinci (16.4%) than in Zadar (12.2%), and this difference is statistically significant ($\chi^2 = 8.55$; $P = 0.0039$)

Table 11. Frequency of periostitis in the Štrbinci skeletal sample

Sex	N[1]	O[2]	%
Subadults	13	8	61.5
Males	45	20	44.4
Females	31	10	32.3
Total	**89**	**38**	**42.7**

N[1] = number of well-preserved skeletons;
O[2] = number of well-preserved skeletons showing signs of periostitis.

Table 12. Frequency of periostitis in the Zadar – Relja skeletal sample

Sex	N[1]	O[2]	%
Subadults	36	24	66.7
Males	58	29	50.0
Females	44	12	27.3
Total	**138**	**165**	**47.1**

N[1] = number of well-preserved skeletons;
O[2] = number of well-preserved skeletons showing signs of periostitis.

Table 13. Frequency of Schmorl's nodes in the Štrbinci skeletal sample

	Thoracic		**Lumbar**		**Total**	
	A[1]/O[2]	%	A/O	%	A/O	%
Females						
Younger[3] adults	13/101	12.9	4/41	9.8	17/142	12.0
Older adults	14/175	8.0	13/81	16.0	27/256	10.5
Total	27/276	9.8	17/122	13.9	44/398	11.1
Males						
Younger adults	18/112	16.1	8/48	16.7	26/160	16.3
Older adults	54/223	24.2	21/101	20.8	75/324	23.1
Total	**72/335**	**21.5**	**29/149**	**19.5**	**101/484**	**20.9**

A[1] = number of vertebrae with Schmorl's defects;
O[2] = number of examined vertebrae;
younger adults[3] = individuals aged 16 to 35; older adults=individuals over 35 years of age.

Table 14. Frequency of Schmorl's nodes in the Zadar – Relja skeletal sample

	Thoracic		Lumbar		Total	
	A[1]/O[2]	%	A/O	%	A/O	%
Females						
Younger[3] adults	7/245	2.9	0/102	0.0	7/347	2.0
Older adults	26/231	11.2	10/99	10.1	36/330	10.9
Total	33/476	6.9	10/201	5.0	43/677	6.3
Males						
Younger adults	59/282	20.9	30/146	20.5	89/428	20.8
Older adults	52/383	13.6	21/189	11.1	73/572	12.8
Total	**111/665**	**16.7**	**51/335**	**15.2**	**162/1000**	**16.2**

A[1] = number of vertebrae with Schmorl's defects;
O[2] = number of examined vertebrae;
younger adults[3] = individuals aged 16 to 35; older adults=individuals over 35 years of age.

Table 15. Frequency of degenerative osteoarthritis on the vertebrae in the Štrbinci skeletal sample

	Cervical		Thoracic		Lumbar		Total	
	A[1]/O[2]	%	A/O	%	A/O	%	A/O	%
Females								
Younger[3] adults	0/51	0.0	4/101	4.0	0/41	0.0	4/193	2.1
Older adults	11/81	13.6	33/175	18.9	16/81	19.7	60/337	17.8
Total	11/132	8.3	37/276	13.4	16/122	13.1	64/530	12.1
Males								
Younger adults	0/59	0.0	1/112	0.9	0/48	0.0	1/219	0.5
Older adults	23/95	24.2	50/223	22.4	27/101	26.7	100/419	23.9
Total	**23/154**	**14.9**	**51/335**	**15.2**	**27/149**	**18.1**	**101/638**	**15.8**

A[1] = number of vertebrae with osteoarthritis;
O[2] = number of examined vertebrae;
younger adults[3] = individuals aged 16 to 35; older adults=individuals over 35 years of age.

The frequencies of vertebral osteoarthritis are shown in **Tables 15 and 16**. The overall frequency of osteoarthritis on the vertebrae in both skeletal samples is almost identical: in Štrbinci it is 14.1% (165/1168) (**Figure 4**), while in Zadar it is 14.8%

(341/2305). There is no significant difference between males (15.8%) and females (12.1%) in Štrbinci, while in Zadar the frequency of degenerative osteoarthritis is significantly higher in males than in females (18.9% vs. 9.2%) (χ^2 = 41,178; P < 0,001). In both samples, osteoarthritis most often appears in the lumbar vertebrae: in Štrbinci this frequency is 15.9%, and in Zadar it is 19.6%.

Table 16. Frequency of degenerative osteoarthritis on the vertebrae in the Zadar – Relja skeletal sample

	Cervical		**Thoracic**		**Lumbar**		**Total**	
	A[1]/O[2]	%	A/O	%	A/O	%	A/O	%
Females								
Younger[3] adults	0/120	0.0	9/245	3.7	2/102	2.0	11/467	2.3
Older adults	32/173	18.5	32/231	13.8	14/99	14.1	78/503	15,5
Total	32/293	10.9	41/476	8.6	16/201	8.0	89/970	9.2
Males								
Younger adults	3/143	2.1	10/282	3.5	2/146	1.4	15/571	2.6
Older adults	41/192	21.3	109/383	28.5	87/189	48.6	237/764	31.0
Total	**44/335**	**12.4**	**119/665**	**17.9**	**89/335**	**26.6**	**252/1335**	**18.9**

A[1] = number of vertebrae with osteoarthritis;
O[2] = number of examined vertebrae;
younger adults[3] = individuals aged 16 to 35; older adults=individuals over 35 years of age.

The frequencies of osteoarthritis on major joints are shown in **Tables 17 and 18**. The overall frequency of osteoarthritis in major joints in Štrbinci is 33.5%, with almost identical frequencies between males (32.4%) and females (35.1%). In the sample from Štrbinci, osteoarthritis among females is most often recorded at the knees and hips, followed by the shoulders and elbows. Among males, osteoarthritis most often appears in the knees, followed by the shoulders and then hips and elbows. In Zadar, the total frequency of osteoarthritis in major joints is somewhat lower than in Štrbinci (25.2%), but this difference is not statistically significant. The Zadar – Relja sample also exhibits statistically higher frequencies of osteoarthritis in males (29.0%) than in females (19.9%) (χ^2 = 4.585; P = 0.0322). In this sample, osteoarthritis among both sexes was most often recorded in the knees and shoulders, followed by the elbows and then hips.

The frequencies of traumas in long bones in Štrbinci are shown in **Table 19**. This table shows each bone with trauma, regardless of whether or not there is more than one trauma on the bone. A total of 807 bones were analysed. The bones were classified based on sex and the part of the body from which they came. Traumas were recorded on only 7 of the 807 analysed bones (0.9%). Traumas were recorded on the radius (3/101 or 3.0%), tibia (2/144 or 1.4%), ulna (1/101 or 1.0%) and femur (1/141 or 0.7%). Table 19 also shows that there is a slight difference in the frequency of trauma with regard to the side of the body – the overall frequency of trauma on the left side is 0.8%, while on the right side it is 1.0%, but the difference is not statistically significant. Additional analysis based on sex also indicates a difference in the frequency of trauma on other bones: among males traumas are present on 1.3% (6/475) of the analysed long bones, while among females traumas are present on 0.3% (1/332) of the analysed bones, but the difference is not statistically significant, most probably, due to the exceptionally small number of traumas. A comparison of the frequency of trauma in Štrbinci with skeletal sample from Zadar – Relja is presented in **Table 20**. This table clearly shows that in terms of frequency of long-bone traumas, the Zadar – Relja sample exhibits much higher frequency compared to the Štrbinci sample (1.9% vs. 09.%). This difference is marginally non-significant (χ^2 = 3.121; P = 0.077). As in Štrbinci, the skeletal sample from Zadar exhibits highest frequency of trauma on the radius (7/159 or 4.4%), but it also exhibits relatively high frequencies of trauma on the humerus (5/191 or 2.6%) and clavicle (5/220 or 2.3%).

Table 17. Frequency of degenerative osteoarthritis on the major joint surfaces in the Štrbinci skeletal sample

	Shoulder		Elbow		Hip		Knee	
	A[1]/O[2]	%	A/O	%	A/O	%	A/O	%
Females								
Younger[3] adults	1/6	16.7	0/5	0.0	1/8	12.5	2/9	22.2
Older adults	7/16	43.8	3/9	33.3	8/20	40.0	10/18	55.5
Total	8/22	21,1	3/14	14,0	9/28	32.1	12/27	44.4
Males								
Younger adults	2/8	25.0	0/11	0.0	1/10	10.0	3/13	23.1
Older adults	7/17	41.2	8/22	36.4	11/27	40.7	13/31	41.9
Total	**9/25**	**36.0**	**8/33**	**24.2**	**12/37**	**32.4**	**16/44**	**36.4**

A[1] = number of joints with osteoarthritis;
O[2] = number of analyzed joints;
younger adults[3] = individuals aged 16 to 35; older adults=individuals over 35 years of age.

Table 18. Frequency of degenerative osteoarthritis on the major joint surfaces in the Zadar – Relja skeletal sample

	Shoulder		Elbow		Hip		Knee	
	A[1]/O[2]	%	A/O	%	A/O	%	A/O	%
Females								
Younger[3] adults	0/32	0.0	0/20	0.0	0/26	0,0	1/25	4.0
Older adults	12/25	48.0	6/23	26.1	6/23	26.1	14/22	63.6
Total	12/57	21.1	6/43	14.0	6/49	12.2	15/47	31.9
Males								
Younger adults	1/27	3.7	1/27	3.7	0/32	0.0	3/30	10.0
Older adults	20/40	50.0	13/37	35.1	17/48	35.4	27/42	64.3
Total	**21/67**	**31.3**	**14/64**	**21.9**	**17/80**	**21.2**	**30/72**	**41.7**

A[1] = number of joints with osteoarthritis;
O[2] = number of analyzed joints;
younger adults[3] = individuals aged 16 to 35; older adults=individuals over 35 years of age.

Table 19. Distribution of long-bone traumas by side and sex in the Štrbinci skeletal sample

	Left side			Right side		
	N[1]	n[2]	%[3]	N	n	%
Clavicles						
Males	30	0	0.0	34	0	0.0
Females	22	0	0.0	26	0	0.0
Humeri						
Males	36	0	0.0	27	0	0.0
Females	17	0	0.0	22	0	0.0
Radii						
Males	31	1	3.2	33	1	3.0
Females	19	0	0.0	18	1	5.5
Ulnae						
Males	30	0	0.0	31	1	3.2
Females	21	0	0.0	21	0	0.0
Femurs						
Males	40	1	2.5	39	0	0.0
Females	30	0	0.0	32	0	0.0
Tibiae						
Males	39	1	2.6	41	1	2.4
Females	29	0	0.0	35	0	0.0
Fibulae						
Males	31	0	0.0	33	0	0.0
Females	20	0	0.0	20	0	0.0
Males	**237**	**3**	**1.3**	**238**	**3**	**1.3**
Females	**158**	**0**	**0.0**	**174**	**1**	**0.6**
Total	**395**	**3**	**0.8**	**412**	**4**	**1.0**

N[1] = total number of long bones; n[2] = total number of long bones with trauma; %[3] = percentage of total number of long bones.

Table 20. Frequency of long-bone traumas in analysed skeletal samples

	Štrbinci			Zadar - Relja		
	N[1]	n[2]	%[3]	N	n	%
Clavicles	112	0	0.0	220	5	2.3
Humeri	102	0	0.0	191	5	2.6
Radii	101	3	3.0	159	7	4.4
Ulnae	103	1	1.0	154	2	1.3
Femurs	141	1	0.7	232	2	0.9
Tibiae	144	2	1.4	192	3	1.6
Fibulae	104	0	0.0	197	2	1.0
Total	**807**	**7**	**0.9**	**1345**	**26**	**1.9**

N[1] = total number of long bones; n[2] = total number of long bones with trauma; %[3] = percentage of total number of long bones.

Figure 5. Schematic representation of the distribution of cranial traumas in adults from the Štrbinci skeletal sample (M. Novak, 2008).

Besides long-bone traumas, cranial and facial traumas were also analysed in Štrbinci. Cranial traumas were observed in six individuals. The frequency of cranial traumas among adults in the analysed sample is relatively high, so that 6 of the 49 (12.2%) well preserved adult skulls exhibit some form of trauma. Cranial and facial traumas were observed only in males (6/32 or 18.7%). Most of the observed traumas on the cranium were situated on the cranial vault (four fractures). Traumas of the cranial vault were located on the frontal bone (one) and left parietal bone (three) (**Figure 5**). Facial traumas were recorded on two skulls, and both cases represent transversal fractures of the nasal bones (**Figures 5 and 6**). All of the observed cranial traumas from the Štrbinci sample represent old, healed fractures probably inflicted by a blunt weapon or tool, or direct punch to the face. The frequency of cranial traumas among adults in the Zadar – Relja sample is higher than in Štrbinci (23.3% vs. 12.2%), but the difference is not statistically significant, most probably, due to the relatively small analysed sample. In Zadar, cranial traumas were more frequent in females than in males (25.9% vs. 21.2%), but this difference is not statistically significant.

Figure 6. Well-healed fracture of the right nasal bone. Male, aged between 51 and 55 years. Štrbinci, grave 75, individual A (photo by V. Vyroubal, 2005).

DISCUSSION

Analysis of the skeletal series from Štrbinci offers important data on the biological history of the inhabitants of continental Croatia. Comparison with other late Antique period samples from this region, like the Zadar sample, helps to expand our knowledge and understanding of living conditions and the way of life of the inhabitants of this territory during the late Antique period. The accumulation of osteological data from skeletal collections is an important step in evaluating conclusions from historical, archaeological and economic sources, as well as for expanding empirical evidence not available through these sources (Šlaus et al. 2004a).

The demographic characteristics of the Štrbinci sample are almost identical to those of the Zadar – Relja sample. In both samples subadults comprise approximately one fourth of the total sample, but are clearly underrepresented, especially in the youngest age category. Subadult mortality in both analysed late Antique skeletal samples from Croatia may seem extremely high, but in fact these ratios do not reveal the true magnitude of subadult mortality which must have been much higher. Under-representation of subadults, similar to that in Štrbinci and Zadar, was observed in numerous Antique skeletal samples from all around Europe (Aner 1971; Kaufmann & Morgenthaler 1975; Kolnik & Stloukal 1974; Kunter 1996; Mikić 1984; Neugebauer-Maresch & Neugebauer 1987; Wahl 1988; Ziegelmayer 1979). As to the under-representation of subadults in the youngest age group, a review of the relevant literature suggests that this is a widespread phenomenon. Similar or even more notable under-representation was observed by Acsádi & Nemeskéri (1970), Alesan et al. (1999), Aner (1971), Kolnik & Stloukal (1974), Kunter (1996), Šlaus (2000, 2006), Šlaus et al. (2007), Wahl (1988), and many other authors. Among the factors contributing to this under-representation are different funeral customs for neonatal deaths and shallower graves of very small children, as well as the chemical composition of the soil (acidity) and frequent reuse of burial sites, especially in urban conglomerations, such as Zadar. All of these have unfavourable effects on the fragile subadult bones.

Many other similarities were noted in the demographic profiles of the analysed samples, such as the identical ratio between males and females, very similar average life spans of adults, and somewhat longer average life span for males in both skeletal series. The small sex differences in average life spans noted in both analysed samples suggest similar stress levels for both sexes.

Frequencies of alveolar bone disease are relatively low, and almost identical in both samples (in Štrbinci 7.5% and in Zadar 7.7%). These values are similar to those observed in many other Antique skeletal series (e. g. Bonfiglioli et al. 2003; Perez-Perez & Lalueza 1992; Schweder & Winkler 2004). Both samples analysed in this paper show another common feature – a slightly higher frequencies of alveolar bone disease in females than in males. This is somewhat unexpected, particularly when one takes into account the clear correlation between older age groups and greater frequencies of alveolar bone disease. Further systematic analyses of dental pathologies in Štrbinci and Zadar are necessary to evaluate the exact cause of this condition.

The Štrbinci sample exhibits significantly higher frequencies of dental caries than the Zadar sample which may suggest different diets in these two series. Typically, higher frequencies of caries are recorded in populations whose diet was generally based on agriculture (Armelagos 1969; Fujita 1995; Larsen et al. 1991; O'Sullivan et al. 1993; Tóth 1970; Wells 1975). The reason is that populations dependent on agriculture have diets with a higher share of carbohydrates: the starch and sugar found in wheat, maize and other crops cultivated at the archaeological sites contained 45% to 80% of the total calories in the diets of pre-industrial agricultural populations (Guthrie 1979). Given the geographic location of the Štrbinci sample, this hypothesis is very probable because the diet of the late Antique populations from continental Croatia was probably based largely on agriculture and depended on cultivated plants. Additional confirmation for this hypothesis may be seen in numerous written sources, such as Cassius Dio, the Roman historian, who at the beginning of the 3rd century AD described Pannonia and its inhabitants: "The Pannonians (…) lead the most miserable existence of all mankind. For they are not well off as regards either soil or climate; they cultivate no olives and produce no wine (…) but drink as well as eat both barley and millet." (*Historia Romana*, 49.36). This theory is additionally confirmed by numerous cereal and legume remains (barley, millet, wheat, lentil etc) found in two Roman graves from Ilok and Šćitarjevo (Šoštarić et al. 2006). The significantly lower frequency of carious lesions in Zadar suggests a diet based more on fish and seafood. It is recognised that fish and seafood are not cariogenic, and some types of sea fish (particularly anchovies and sardines) are exceptionally rich with fluoride that protects teeth from caries and bleeding gums (Konig 2000; Van Loveren 2000). Additionally, there is clear historical data that fishing was a very important branch of economy in Antique Zadar (Peričić 1999; Suić 1981).

Linear enamel hypoplasia frequencies in both analysed samples are very similar and correspond well to the results observed in other Antique populations from the Roman Empire (e. g. Facchini et al. 2004; Manzi et al. 1999; Perez-Perez & Lalueza 1992). Such LEH frequencies are characteristic for sedentary populations with agriculture based diets (Lanphear 1990). Relatively high frequency of LEH in both samples suggests that more than half of the analysed individuals survived strong metabolic stress during their childhood, possibly during the weaning period. Namely, some authors (Goodman 1988; Goodman et al. 1984; Hodges 1986; Lanphear 1990) noted that most of the hypoplastic defects in the sedentary populations are formed between the first and third year of life, i. e. during the transition from the diet based on the sterile breast milk to the diet rich with micro organisms. However, it is important to stress that serious doubts about this interpretation have been raised (Blakey et al. 1994), and that serious methodological problems related to the age assessment of the defects have been identified (Hodges and Wilkinson 1990).

Cribra orbitalia is generally accepted as a sensitive and reliable osteological indicator of subadult anaemia caused by iron deficiencies, which emerged due to inadequate nutrition, endemic parasitism, unhygienic living conditions or chronic gastrointestinal disease (Larsen 1997; Mittler & Van Gerven 1994). The frequencies observed in Štrbinci and Zadar are similar to those observed in other populations from the Roman period (e.g. Salvadei et al. 2001; Stuart-Macadam 1985). When comparing the two samples there are no statistically significant differences in the frequency of cribra orbitalia among adults. The frequency of this pathology among subadults is somewhat higher in Zadar, but again, without statistically significant differences. The one, essential, difference between the two samples is the frequency of the *active* form of cribra orbitalia. This distinction is exceptionally important: healed forms indicate that the affected person survived anaemia, while active forms suggest that anaemia caused by an absence of iron significantly compromised the health of these individuals. Significantly higher frequency of the active form of cribra orbitalia among subadults in Štrbinci may be the result of numerous factors, including among others a relatively unhealthy environment abundant with marshlands and forests. Antique Pannonia was dominantly a wooded region filled with swamps, as mentioned by numerous Roman historians (e. g. Pliny the Elder, Florus, Herodian, Cassius Dio, Aurelius Victor etc.). Because of the abundance of rivers, and its flat terrain, continental Croatia is full of, in some cases, very large marshes. This is such a predominant feature of the landscape that Mayer (1957) states that towns with Roman names such as Mursa, Mursella and Marsonia derived their name from the Indo-European root **murs*- meaning swamp or marsh. Considerable effort was put into draining these marshes during Roman times. For instance, following his wars on the Danube limes the emperor Marcus Aurelius resettled the Celtic tribe Cotini from their homeland in Dacia to the area between Osijek and Vinkovci and set them to draining the large swamp called Hiulca palus (Pinterović 1978). This kind of unhealthy environment may have been a host for various parasitic infections which may be responsible for the higher frequencies of the active form of cribra orbitalia among subadults in Roman period Certissia.

The appearance of non-specific infectious diseases is frequently connected with iron deficiency anaemia resulting from an inadequate diet and parasitism (Stuart-Macadam 1992). In the two late Antique skeletal series from Croatia infectious diseases identified through non-specific periostitis are present in high frequencies, and these frequencies are consistent with the relatively high frequencies of cribra orbitalia and linear enamel hypoplasia. In both, Štrbinci and Zadar the frequency of periostitis is somewhat higher in males than in females, which is consistent to the data observed by Brothwell (1986) and Paine et al. (2007) for late Antique/Byzantine skeletal samples from Turkey. These authors suggest that males were more frequently under stress due to se specific activity patterns that exposed males to more difficult physical tasks (Paine et al. 2007).

Schmorl's nodes on the vertebrae testify to strong mechanical burdens on the spine. The significantly higher frequencies of Schmorl's nodes among males in both analysed samples is consisted with data observed in numerous Croatian archaeological populations regardless of the chronological period (e.g. Novak et al. 2007; Šlaus 2000, 2002a, 2006; Šlaus et al. 2004a, 2007). These data also strongly suggest a sex-based division of labour where males performed more difficult physical tasks. Significantly higher frequency of Schmorl's nodes in the Štrbinci series suggests that working conditions in this site were more arduous than in Zadar, possibly due to the less favourable environment (abundant with swamps and forests) during the late Antique period. Different frequencies of Schmorl's nodes between these two sites might also be the result of the differences between urban and rural lifestyles, i. e. during the late Antique period Štrbinci was relatively small settlement, while Zadar was one of the largest cities on the eastern Adriatic coast.

The factors that contribute most to osteoarthritis are mechanical stress, physical activity (Hough & Sokoloff 1989; McKeag 1992) and advanced age. Even today, most individuals older than forty years develop osteoarthritic changes on vertebrae (Dieppe & Lim 1998; Schmorl & Junghanns 1971). Thus the considerably higher frequency of osteoarthritic changes on all analysed segments of the vertebrae among males in comparison to females in both samples is closely tied to the longer average life span of males in both series and additionally confirms the hypothesis stated earlier on the sex-based division of labour. Additionally, the higher frequency of osteoarthritis on all major joints in Zadar is an expected consequence of the longer average life span in this sample. At this point we are not sure about the cause of slightly higher osteoarthritis frequencies on the major joints of females in Štrbinci, especially taking into consideration a somewhat longer average life span of males in this sample.

Both analysed late Antique skeletal samples from Croatia display similar, relatively low prevalence of long bone fractures. In an attempt to get a clearer picture of trauma patterns in the analysed samples, an effort was made to distinguish traumas that were the result of accidents and those that were the result of deliberate violence.

Evidence for long bone fractures that were the result of intentional interhuman violence in both skeletal collections is scarce. In both Štrbinci and Zadar the most frequent location of fractures was on the radius (in Štrbinci 3.0% and in Zadar 4.4%). Most of the observed radial traumas in both samples were so called Colles' fractures, a type of fracture most often attributed to accidents, i. e. to falling onto pronated arms and outstretched hands (Kilgore et al. 1997; Ortner 2003).

A part of the postcranial skeleton which has frequently been utilized as an indicator of intentional violence is the ulna, or more precisely the presence of so-called 'parry' fractures of the distal or middle third of the ulna. The aetiology of this fracture is explained by the following scenario: in an attempt to protect one's head from blows, a person raises his arm to protect his head and face. In this position, ulna is closest to the attacker and as a consequence suffers the largest amount of force from the blow, and therefore breaks (e. g. Merbs 1989; Ortner 2003; Wells 1964). In this context, the low frequencies of ulnar fractures in Štrbinci (1.0%) and Zadar (1.3%) might suggest low amount of intentional violence in the studied skeletal collections.

However, analysis of cranial traumas suggests a higher degree of intentional violence in the analysed samples. Numerous authors (e.g. Alvrus 1999; Standen & Arriaza 2000; Tyson 1977; Walker 1989, 1997) point out those high frequencies of head and face traumas are clear evidence of intentional interhuman violence. The frequency of cranial traumas in Štrbinci and Zadar is higher than the frequencies observed in other osteological samples from around the world (e. g. Bennike 1985; Ferguson 1980; Jurmain 2001; Miles 1975; Morse 1969; Owsley et al. 1994; Robb 1997; Snow 1948; Stewart & Quade 1969). Only several authors recorded frequencies similar to those in late Antique skeletal samples from Croatia (Alvrus 1999; Heinrich 1991; Novak et al. 2007; Šlaus & Novak 2006; Walker 1989; Webb 1995). The two nasal fractures in Štrbinci give an additional support for the theory of a somewhat higher degree of physical risk and potential indicator of sporadic episodes of interpersonal violence in this sample. Therefore, it seems that in both series, intentional human violence was a relatively frequent occurrence.

CONCLUSION

This paper presents the results of bioarchaeological analyses of the late Antique skeletal sample from Štrbinci and its comparison with the Antique period skeletal sample from Zadar. The different geographical locations and significantly different ecological settings of these sites suggest different living conditions in these populations, which, in theory could affect health and therefore be identified by the analysis of the skeletal and dental markers of health analysed in this study. Detailed paleodemographic and paleopathological analyses of these samples showed no significant differences between them. This study shows that, with the exception of one skeletal indicator of dental disease (caries), one skeletal indicator of subadult stress (the active form of cribra orbitalia) and one skeletal indicator of physical activity (Schmorl's nodes), no significant differences in the quality of life are evident between individuals who inhabited the continental part of Croatia (Štrbinci) and individuals who inhabited Croatia's eastern Adriatic coast (Zadar) during the late Antique period. The results of this research suggest similar levels of stress between these populations which may have been the result of similar social and economical circumstances in which both these populations lived. Future research of other Antique skeletal samples from Croatia is necessary to see if data from these series support this conclusion.

Sažetak

Bioarheologija kasnoantičke populacije sa Štrbinaca

Svrha ovog rada jest prikazati rezultate bioarheološke analize populacije pokopane na kasnoantičkoj nekropoli u Štrbincima te skeletni uzorak usporediti s antičkim skeletnim uzorkom s nekropole Zadar – Relja. Činjenica da su Štrbinci i Zadar smješteni u različitim geografskim i klimatsko-ekološkim cjelinama sugerirala je različite životne uvjete i razine proživljenog stresa u analiziranim populacijama.

Paleodemografske analize upozorile su na podjednaku doživljenu starost u oba uzorka (u Štrbincima muškarci su živjeli prosječno 39,0 godina, a žene 37,0 godina; u Zadru muškarci su živjeli prosječno 38,4 godina, a žene 37,4 godina) i na jasnu podzastupljenost djece u oba uzorka. Učestalosti alveolarnih bolesti u oba su uzorka relativno niske i vrlo slične, a statistički značajno veća učestalost karijesa u Štrbincima sugerira različit način prehrane između uzoraka (prehrana u Štrbincima vjerojatno se temeljila na poljoprivredi i žitaricama, a u Zadru na ribi i plodovima mora). Učestalost pokazatelja subadultnog stresa (*cribra orbitalia* i hipoplazija zubne cakline) u oba je uzorka vrlo slična, s jednom bitnom razlikom: u Štrbincima je prisutna bitno veća učestalost aktivnog oblika *cribrae orbitaliae* u odnosu na Zadar (16,6% i 66,7%). To se objašnjava nezdravim ekološkim sustavom, ispunjenim brojnim šumama i močvarama, koji je okruživao Štrbince tijekom kasne antike, što je vjerojatno pogodovalo razvoju parazitskih infekcija. Analiza učestalosti zaraznih bolesti sugerira da su muškarci bili nešto podložniji razvoju zaraznih bolesti od žena, moguće zbog težih fizičkih poslova koje su obavljali. Značajno veća učestalost pokazatelja fizičkog napora kod muškaraca u oba uzorka snažno sugerira podjelu poslova baziranu na spolu, pri čemu su muškarci obavljali teže fizičke poslove. Analiza trauma sugerira da je većina trauma u Štrbincima nastala kao posljedica nesretnih slučajeva, ali nešto veća učestalost trauma glave i prisutnost dvije frakture nosa mogle bi sugerirati sporadične pojave međuljudskog nasilja.

Ovo je istraživanje pokazalo da, s izuzetkom učestalosti karijesa, aktivnog oblika *cribrae orbitaliae* i Schmorlovih defekata, ne postoje bitne razlike u kvaliteti života između populacija koje su tijekom kasne antike nastavale Štrbince i Zadar, što je najvjerojatnije posljedica vrlo sličnih društvenih i gospodarskih uvjeta.

Prijevod: *Mario Novak*

LITERATURE

Acsádi, Nemeskéri 1970	G. Acsádi, J. Nemeskéri, *History of human life span and mortality*, Akadémiai Kiadó, Budapest.
Alesan et al. 1999	A. Alesan, A. Malgosa, C. Simó, Looking into the demography of an Iron Age population in the Western Mediterranean. I. Mortality, *AJA*, 110, 285-301.
Alvrus 1999	A. Alvrus, Fracture Patterns Among the Nubians of Semna South, Sudanese Nubia, *International Journal of Osteoarchaeology*, 9, 417-429.
Aner 1971	U. Aner Die anthropologische Untersuchung der Leichen-

brande aus dem Urnenfriedhof Hamfelde, Kreis Herzogtum Lauenburg in Holstein, in: N. Bantelmann (ed.), *Hamfelde, Kreis Herzogtum Lauenburg. Ein Urnenfriedhof der romischen Kaiserzeit in Holstein*, Offa-Bucher 24, 58-77.

Armelagos 1969 — G. J. Armelagos, Disease in ancient Nubia, *Science*, 163, 255-259.

Ascenzi et al. 1991 — A. Ascenzi, A. Bellelli, M. Brunori, G. Citro, R. Ippoliti, E. Lendaro, R. Zito, Diagnosis of thalassemia in ancient bones: Problems and prospects in pathology, in: D. Ortner, A, Aufderheide (eds.), *Human Paleopathology. Current Synthesis and Future Options*, Smithsonian Institution Press, Washington DC, 73-75.

Balakrishnan et al. 2000 — M. Balakrishnan, R. S. Simmonds, J. R. Tagg, Dental caries is a preventable infectious disease, *Australian Dental Journal*, 45 (4), 235-245.

Bass 1995 — W. M. Bass, *Human Osteology. A Laboratory and Field Manual of the Human Skeleton*, Missouri Archaeological Society, Columbia.

Bennike 1985 — P. Bennike, *Paleopathology of Danish Skeletons: A Comparative Study of Demography, Disease and Injury*, Akademisk Forlag, Copenhagen.

Blakey et al. 1994 — M. L. Blakey, T. E. Leslie, J. P. Reidy, Frequency and chronological distribution of dental enamel hypoplasia in enslaved African Americans: a test of the weaning hypothesis, *AJPhA*, 95, 371-383.

Bonfiglioli et al. 2003 — B. Bonfiglioli, P. Brasili, M. G. Belcastro, Dento-alveolar lesions and nutritional habits of a Roman Imperial age population (1st-4th c. AD): Quadrella (Molise, Italy), *Homo*, 54 (1), 36-56.

Bridges 1991 — P. S. Bridges, Degenerative joint disease in hunter-gatherers and agriculturalists from the southeastern United States, *AJPhA*, 85, 379-391.

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

Brothwell 1986 — D. Brothwell The human bones, in: R. M. Harrison (ed.), *Excavation at Saraçhane in Istanbul, vol. 1. The Excavation, Structures, Architectural Decoration, Small Finds, Coins, Bones, and Molluscs*, Princeton University Press, Princeton, 374-398.

Brusić & Gluščević 1990 — Z. Brusić, S. Gluščević, *Zadar – istraživanje antičkog grada mrtvih*, Muzejsko-galerijski centar, Zagreb.

Cucina & Tiesler 2003 — A. Cucina, V. Tiesler, Dental Caries and Antemortem Tooth Loss in the Northern Peten Area, Mexico: A Biocultural Perspective on Social Status Differences Among the Classic Maya, *AJPhA*, 122, 1-10.

Cunha & Umbelino 1995 — E. Cunha, C. Umbelino, What can bones tell about labour and occupation: the analysis of skeletal markers of occupational stress in the Identified Skeletal Collection of the Anthropological Museum of the University of Coimbra (preliminary results), *Antropologia Portuguesa*, 13, 49-68.

Dieppe & Lim 1998 — P. Dieppe, K. Lim, Clinical features and diagnostic problems, in: J. Klippel, P. Dieppe (eds.), *Rheumatology*, Mosby, London, 3.1-3.16.

El-Najjar et al. 1976 — M. E1-Najjar, D. Ryan, C. Turner, B. Lozoff, The etiology of porotic hyperostosis among the prehistoric and historic Anasazi Indians of Southwestern United States, *AJPhA*, 44, 477-488.

Facchini et al. 2004 — F. Facchini, E. Rastelli, P. Brasili, Cribra orbitalia and cribra cranii in Roman skeletal remains from the Ravenna area and Rimini (I-IV century AD), *International Journal of Osteoarchaeology*, 14, 126-136.

Fadić 2006a — I. Fadić, Zadar – Relja (Trgovački centar), *HAG*, 3, 347-349.

Fadić 2006b — I. Fadić, Zadar – Relja (Vrt Relja), *HAG*, 3, 350-352.

Fadić 2006c — I. Fadić, Zadar – Relja (Zrinsko-frankopanska ulica), *HAG*, 3, 352-354.

Fazekas & Kósa 1978 — I. G. Fazekas, F. Kósa, *Forensic fetal osteology*, Akadémiai Kiadó, Budapest.

Ferguson 1980 — C. Ferguson, Analysis of skeletal remains, in: L. S. Cordel (ed.), *Tijeras Canyon: analysis of the past*, University of New Mexico, Albuquerque, 121-148.

Fujita 1995 — H. Fujita, Geographical and chronological differences in dental caries in the Neolithic Jomon Period of Japan, *Anthropological Science*, 103, 23-37.

Goodman 1988 — A. H. Goodman, The chronology of enamel hypoplasias in industrial population: A reppraisal of Sarnat and Schour (1941, 1942), *Human Biology*, 60, 781-791.

Goodman & Rose 1990 — A. H. Goodman, J. C. Rose, Assessment of systemic physiological perturbations from dental enamel hypoplasia and associated histological structures, *Yearbook of Physical Anthropology*, 33, 59-110.

Goodman et al. 1984 — A. H. Goodman, G. J. Armelagos, J. C. Rose, The chronological distribution of enamel hypoplasias from prehistoric Dickson Mounds populations, *AJPhA*, 65, 259-266.

Grauer & Roberts 1996 — A. L. Grauer, C. A. Roberts, Paleoepidemiology, Healing, and Possible Treatment of Trauma in the Medieval Cemetery Population of St. Helen-on-the-Walls, York, England, *AJPhA*, 100, 531-544.

Guatelli-Steinberg & Lukacs 1999 D. Guatelli-Steinberg, J. R. Lukacs, Interpreting sex differences in enamel hypoplasia in human and non-human primates: developmental, environmental and cultural considerations, *Yearbook of Physical Anthropology*, 42, 73-126.

Guthrie 1979 H. A. Guthrie, *Introduction to Nutrition*, C. V. Mosby, St. Louis.

Heinrich 1991 W. Heinrich, Disease and injury in the Late Middle ages in Eggenburg, lower Austria, *Anthropologischer Anzeiger*, 49, 239-260.

Hincak et al. (2007) Z. Hincak, D. Mihelić, A. Bugar, Cremated Human and Animal Remains of the Roman Period – Microscopic Method of Analysis (Šepkovčica, Croatia), *Collegium Antropologicum*, 31 (4), 1127-1134.

Hodges 1986 D. C. Hodges, *Agricultural intensification and prehistoric health in the Valley of Oaxaca, Mexico*, doctoral dissertation, University of New York, Albany.

Hodges & Wilkinson 1990 D. C. Hodges, R. G. Wilkinson, Effect of tooth size on the ageing and chronology distribution of enamel hypoplastic defects, *American Journal of Human Biology*, 2, 553-560.

Hough & Sokoloff 1989 A. J. Hough, L. Sokoloff, Pathology of osteoarthritis, in: D. J. McCarty (ed.), *Arthritis and Allied Conditions*, Lea and Febiger, Philadelphia, 1571-1594.

İşcan et al. 1984 M. Y. İşcan, S. R. Loth, R. K. Wright, Age estimation from the rib by phase analysis: White males, *Journal of Forensic Sciences*, 29, 1094-1104.

İşcan et al. 1985 M. Y. İşcan, S. R. Loth, R. K. Wright, Age estimation from the rib by phase analysis: White females, *Journal of Forensic Sciences*, 30, 853-863.

Jurmain 1999 R. D. Jurmain, *Stories from the skeleton: Behavioral reconstruction in human osteology*, Gordon and Breach, Amsterdam.

Jurmain 2001 R. D. Jurmain, Paleoepidemiological patterns of trauma in a prehistoric population from central California, *AJPhA*, 115, 13-23.

Jurmain & Kilgore 1995 R. D. Jurmain, L. Kilgore, Skeletal evidence of osteoarthritis: A paleopathological perspective, *Annals of the Rheumatic Diseases*, 54, 443-450.

Kaufmann & Morgenthaler 1975 B. Kaufmann, W. Morgenthaler, Die menshlichen Skelettreste aus dem spätrömischen-völkerwanderungszeitlichen Gräberfeld von Schiers GR., *Vierteljahresschrift der Naturforschenden Gesellschaft in Zürich*, 120, 159-220.

Kilgore et al. 1997 L. Kilgore, R. Jurmain, D. Van Gerven, Palaeoepidemiological Patterns of Trauma in a Medieval Nubian Skeletal Population, *International Journal of Osteoarchaeology*, 7, 103-114.

Kimura 1982 — K. Kimura, Sex differences of the hip bone among several populations, *Okajimas Folia Anatomica Japonica*, 58, 266-273.

Kolnik & Stloukal 1974 — T. Kolnik, M. Stloukal, Pohrebiste z doby rimske v Abrahamu (okr. Galanta), *Casopis Narodniho Muzea*, 143, 57-68.

Konig 2000 — K. G. Konig, Diet and Oral Health, *International Dental Journal*, 50, 162-174.

Krogman & Iscan 1986 — W. M. Krogman, M. Y. Iscan, *The human skeleton in forensic medicine*, C. C. Thomas, Springfield:.

Kunter 1996 — M. Kunter, Anthropologische Analyse der menschlichen Leichenbrande aus dem romischen Brandgraberfeld von Septfontaines – Deckt, Luxemburg, in: M. Polfer (ed.), *Das galloromische Brandgraberfeld und der dazugehorige Verbrennungsplatz von Septfontaines – Deckt (Luxembourg)*, Dossiers d'archaeologie du musee national d'histoire de d'aret (Luxembourg) 5, 190-200.

Lanphear 1990 — K. M. Lanphear, Frequency and Distribution of Enamel Hypoplasias in a Historic Skeletal Sample, *AJPhA*, 81, 35-43.

Larsen 1997 — C. S. Larsen, *Bioarchaeology: Interpreting behavior from the human skeleton*, Cambridge University Press, Cambridge.

Larsen & Sering 2000 — C. S. Larsen, L. Sering, Inferring iron deficiency anemia from human skeletal remains: The case of the Georgia Bight, in: P. Lambert (ed.), *Bioarchaeological Studies in Life in the Age of Agriculture*, University of Alabama Press, Tuscaloosa, 116-133.

Larsen et al. 1991 — C. S. Larsen, R. Shavit, M. C. Griffin, Dental caries evidence for dietary change: An archaeological context, in: M. A. Kelley, C. S. Larsen (eds.), *Advances in Dental Anthropology*, Wiley-Liss, New York, 179-202.

Lieverse et al. 2007 — A. R. Lieverse, A. W. Weber, V. I. Bazaliiskiy, O. I. Goriunova, N. A. Savel'ev, Osteoarthritis in Siberia's Cis-Baikal: Skeletal Indicators of Hunter-Gatherer Adaptation and Cultural Change, *AJPhA*, 132, 1-16.

Lovejoy et al. 1985 — C. O. Lovejoy, R. S. Meindl, T. R. Pryzbeck, R. P. Mensforth, Chronological metamorphosis of the auricular surface of the ilium: A new method for the determination of age at death, *AJPhA*, 68, 15-28.

Mann & Jantz 1988 — R. W. Mann, R. L. Jantz, Maxillary suture obliteration: Aging the human skeleton based on intact or fragmentary maxilla, *Journal of Forensic Sciences*, 32, 148-157.

Manzi et al. 1999 — G. Manzi, L. Salvadei, A. Vienna, P. Passarello, Discontinuity of Life Conditions at the Transition From the Roman Imperial Age to the Early Middle Ages: Example From Central Italy Evaluated by Pathological Dento-Alveolar Lesions, *American Journal of Human Biology*, 11, 327-341.

Mayer 1957 — A. Mayer, *Die Sprache der alten Illyrier, I*, Schriften der Balkankommission, Linguistische Abteilung 15, Wien.

McKeag 1992	D. B. McKeag, The relationship of osteoarthritis and exercise, *Clinics in Sports Medicine*, 11, 471-487.
McKern & Stewart 1957	T. W. McKern, T. D. Stewart, *Skeletal age changes in young American males. Analyzed from the standpoint of age identification*, Environmental protection research division, Natick.
McWhirr et al. 1982	A. McWhirr, D. Viner, C. Wells, *Romano-British Cemeteries at Cirencester*, Cirencester Excavation Committee, Cirencester.
Meindl & Lovejoy 1985	R. S. Meindl, C. O. Lovejoy, Ectocranial suture closure: A revised method for the determination of skeletal age at death based on the lateral – anterior sutures, *AJPhA*, 68, 57-66.
Mensforth et al. 1978	R. P. Mensforth, C. O. Lovejoy, J. W. Lallo, G. J. Armelagos, The role of constitutional factors, diet and infectious disease in the etiology of porotic hyperostosis and periosteal reactions in prehistoric infants and children, *Medical Anthropology*, 2, 1-59.
Merbs 1989	C. F. Merbs, Trauma, in: M. Y. İşcan, K. A. R. Kennedy (eds.), *Reconstructing of life from the skeleton*, Alan R. Liss, New York, 161-190.
Migotti 2006	B. Migotti, Kasnoantičko groblje na Štrbincima kod Đakova – iskopavanja u 2002. i 2003, *ARR*, 15, 125-209.
Migotti & Pavlović 2005	B. Migotti, I. Pavlović, Štrbinci, *HAG*, 1, 12-15.
Mikić 1984	Ž. Mikić, Beiträge zur Anthropologie spätrömischer bis spätmittelalterlicher Bevölkerungen Jugoslawiens, *GodCBI*, 22, 5-109.
Miles 1975	J. S. Miles, *Orthopedic problems of the Wetherill Mesa population, Mesa Verde National Park, Colorado*, US Department of the Interior, National Park Service, Washington DC.
Mittler & Van Gerven 1994	D. M. Mittler, D. P. Van Gerven, Developmental, diachronic, and demographic analysis of cribra orbitalia in the medieval Christian populations of Kulubnarti, *AJPhA*, 93, 287-297.
Moorrees et al. 1963	C. F. A. Moorrees, E. A. Fanning, E. E. Hunt, Age variation of formation stages for ten permanent teeth, *Journal of Dental Research*, 42, 1490-1502.
Morse 1969	D. Morse, *Ancient diseases in the Midwest*, Illinois State Museum, Springfield.
Neugebauer 1987	Neugebauer-Maresch C. Neugebauer-Maresch, J. W. Neugebauer, *Das werden der Stadt Klosterneuburg, Teil 1. Urzeit – Römerzeit – Frühmittelalter*, Amtsblatt der Stadtgemeinde Klosterneuburg 3, 1-8.
Novak 2007	M. Novak, Trauma analysis in Roman era skeletal sample from Zadar – Relja, *Abstracts of the 13th annual meeting of the European association of archaeologists (18th-23rd Sept 2007, Zadar – Croatia)*, Sveučilište u Zadru, Zadar, 338-339.

Novak et al. 2007 — M. Novak, M. Šlaus, M. Pasarić, Bioarheološke osobine novovjekovne populacije s nalazišta Koprivno – Kod križa kraj Klisa, *OA*, 31, 303-346.

O'Sullivan et al. 1993 — E. A. O'Sullivan, S. A. Williams, R. C. Wakefield, J. E. Cape, M. E. J. Curzon, Prevalence and site characteristics of dental caries in primary molar teeth from prehistoric times to the 18th Century in England, *Caries Research*, 27, 147-153.

Ortner 2003 — D. J. Ortner, *Identification of Pathological Conditions in Human Skeletal Remains*, Amsterdam, Academic Press, San Diego.

Owsley & Jantz 1978 — D. W. Owsley, R. L. Jantz, Intracemetery morphological variation in Arikara crania from the Sully site (39SL4), Sully County, South Dakota, *Plains Anthropologist*, 23, 139-147.

Owsley et al. 1994 — D. W. Owsley, G. W. Gill, S. D. Owsley, Biological effects of European contact on Easter Island, in: C. S. Larsen, G. R. Milner (eds.), *Biological responses to conquest*, Wiley-Liss, New York, 161-177.

Paine et al. 2007 — R. R. Paine, R. Vargiu, A. Coppa, C. Morselli, E. E. Schneider, A health assessment of high status Christian burials recovered from the Roman – Byzantine archaeological site of Elaiussa Sebaste, Turkey, *Homo*, 58, 173-190.

Phenice 1969 — T. W. Phenice, A newly developed visual method of sexing the os pubis, *AJPhA*, 30, 297-301.

Perez-Perez & Lalueza 1992 — A. Perez-Perez, C. Lalueza, Indicadores des estrés nutriciononal y patológico en series de época romana en Catalunya, *Munibe*, 44 (8), 145-141.

Peričić 1999 — Š. Peričić, *Razvitak gospodarstva Zadra i okolice u prošlosti*, Hrvatska akademija znanosti i umjetnosti, Zagreb – Zadar.

Pfeiffer 1991 — S. Pfeiffer, Estimation of age at death, in: S. Pfeiffer, S. R. Williamson (eds.), *An investigation of a military cemetery from the war of 1812*, Dundurn Press, Toronto.

Pindborg 1970 — J. J. Pindborg, *Pathology of the dental hard tissues*, W. B. Saunders, Philadelphia.

Pinterović 1978 — D. Pinterović, *Mursa i njeno područje u antičko doba*, Hrvatska akademija znanosti i umjetnosti, Osijek.

Rajić & Ujčić 2003 — P. Rajić, Ž. Ujčić, Anthropological analysis of the Late Roman/ Early Medieval cemetery of Novigrad (Istria), *Collegium Antropologicum*, 27, 803-808.

Reinhard 1992 — K. Reinhard, Patterns of diet, parasitism and anemia in prehistoric west North America, in: P. Stuart-Macadam, S. Kent (eds.), *Diet, Demography, and Disease: Changing Perspectives on Anemia*, Aldine de Gruyter, New York, 219-258.

Robb 1997 — J. Robb, Violence and gender in early Italy, in: D. W. Martin, D. L. Frayer (eds.), *Troubled times: Violence and Warfare in the*

	Past (War and Society), Gordon and Breach, Amsterdam, 77-109.
Salvadei et al. 2001	L. Salvadei, F. Ricci, G. Manzi, Porotic hyperostosis as a marker of health and nutritional conditions during childhood: studies at the transition between Imperial Rome and the Early Middle Ages, *American Journal of Human Biology*, 13, 709-717.
Scheuer & Black 2000	L. Scheuer, S. Black, *Developmental Juvenile Osteology*, Academic Press, New York.
Schmorl & Junghanns 1971	G. Schmorl, H. Junghanns, *The Human Spine in Health and Disease*, Grune and Stratton, New York.
Schweder & Winkler 2004	B. I. M. Schweder, E.-M. Winkler, *Untersuchungen zu den Gräberfeldern in Carnuntum Band II: Die menschlichen Skelettreste des römerzeitlichen Gräberfeldes Petronell – Carnuntum südlich der Zivilstadt (Notgrabungen 1984-1986)*, Verlag der Österreichischen Akademie der Wissenschaften, Wien.
Schwidetzky & Rösing 1984	I. Schwidetzky, F. W. Rösing, Vergleichend-statistische Untersuchungen zur Anthropologie der Neuzeit (nach 1500), *Homo*, 35, 1-49.
Snow 1948	C. E. Snow, Indian Knoll skeletons of site Oh 2 Ohio County, Kentucky, *University of Kentucky Reports in Anthropology*, 4, 321-554.
Standen & Ariazza 2000	V. G. Standen, B. T. Ariazza, Trauma in the Preceramic Coastal Populations of Northern Chile: Violence or Occupational Hazards?, *AJPhA*, 112, 239-249.
Steckel & Rose 2002	R. H. Steckel, J. C. Rose, *The Backbone of History. Health and Nutrition in the Western Hemisphere*, Cambridge University Press, Cambridge.
Stewart & Quade 1969	T. D. Stewart, L. G. Quade, Lesions of the frontal bone in American Indians, *AJPhA*, 30, 89-110.
Stuart-Macadam 1985	P. Stuart-Macadam, Porotic hyperostosis: representative of a childhood condition, *AJPhA*, 66, 391-398.
Stuart-Macadam 1992	P. Stuart-Macadam, Porotic hyperostosis: a new perspective, *AJPhA*, 87, 39-47.
Suckling 1989	G. Suckling, Developmental defects of enamel – Historical and present-day perspectives of their pathogenesis, *Advances in Dental Research*, 3, 87-94.
Suić 1981	M. Suić, *Zadar u starom vijeku*, Filozofski fakultet, Zadar.
Sullivan 2005	A. Sullivan, Prevalence and etiology of acquired anemia in Medieval York, England, *AJPhA*, 128, 252-272.
Sutherland & Suchey 1991	L. D. Sutherland, J. M. Suchey, Use of the ventral arc in pubic sex determination, *Journal of Forensic Sciences*, 36, 501-511.
Šlaus 1998	M. Šlaus, Antropološka analiza osteološkog materijala, in: B. Migotti (ed.), *Accede ad Certissiam – Antički i ranokršćanski*

	horizont arheološkog nalazišta Štrbinci kod Đakova, Hrvatska akademija znanosti i umjetnosti, Zagreb, 121-134.
Šlaus 1999	M. Šlaus, Antropološka analiza kasnoantičke populacije s nalazišta Ad Basilicas Pictas, in: F. Oreb, T. Rismondo, M. Topić (eds.), *Ad Basilicas Pictas*, Konzervatorski odjel Ministarstva kulture, Split, 60-65.
Šlaus 2000	M. Šlaus, Biocultural analysis of sex differences in mortality profiles and stress levels in the late Medieval population from Nova Rača, Croatia, *AJPhA*, 111, 193-209.
Šlaus 2001	M. Šlaus, Bioarchaeological research of the Štrbinci skeletal series, *ARR*, 13, 205-224.
Šlaus 2002a	M. Šlaus, *The Bioarchaeology of Continental Croatia. An analysis of human skeletal remains from the prehistoric to post–medieval periods*, Archaeopress, Oxford.
Šlaus 2002b	M. Šlaus, Rezultati antropološke analize ljudskog osteološkog materijala s nalazišta Narona – Erešove bare, *VAHD*, 94, 205-215.
Šlaus 2006	M. Šlaus, *Bioarheologija. Demografija, zdravlje, traume i prehrana starohrvatskih populacija*, Školska knjiga, Zagreb.
Šlaus 2008	M. Šlaus, Osteological and dental markers of health in the transition from the Late Antique to the Early Medieval period in Croatia, *AJPhA*, 136, 455-469.
Šlaus & Novak 2006	M. Šlaus, M. Novak, Analiza trauma u srednjovjekovnim uzorcima iz Kliškovca i Crkvara, *PrilIArh*, 23, 213-228.
Šlaus et al. 2004a	M. Šlaus, M. Novak, D. Kollmann, The Štrbinci skeletal series in context of other Late Antique skeletal series from continental Croatia, *ARR*, 14 247-292.
Šlaus et al. 2004b	M. Šlaus, N. Pećina-Šlaus, H. Brkić, Life stress on the Roman limes in continental Croatia, *Homo*, 54, 240-263.
Šlaus et al. 2007	M. Šlaus, M. Novak, Ž. Bedić, V. Vyroubal, Antropološka analiza kasnosrednjovjekovnog groblja kraj crkve svetog Franje na Opatovini u Zagrebu, *ARR*, 15, 211-247.
Šoštarić et al. 2006	R. Šoštarić, M. Dizdar, D. Kušan, V. Hršak, S. Mareković, Comparative Analysis of Plant Finds from Early Roman Graves in Ilok (*Cuccium*) and Šćitarjevo (*Andautonia*), Croatia – A Contribution to Understanding Burial Rites in Southern Pannonia, *Collegium Antropologicum*, 30 (2), 429-436.
Taylor 1985	M. Taylor, The paleopathology of a Southern Sinagua population from Oak Creek Pueblo, Arizona, in: C. Merbs, R. Miller (eds.), *Health and Disease in the Prehistoric Southwest*, Arizona State Univesity Anthropological Research Papers no. 34, Arizona State University, Tempe, 115-118.
Tóth 1970	K. Tóth, *The Epidemiology of Dental Caries in Hungary*, Akadémiai Kiadó, Budapest.

Tyson 1977 — R. A. Tyson, Historical accounts as aids to physical anthropology. Examples of head injury in Baja California, *Pacific Coast Archaeological Society Quarterly*, 13, 52-58.

Ubelaker 1992 — D. Ubelaker, Porotic hyperostosis in prehistoric Ecuador, in: P. Stuart-Macadam, S. Kent (eds.), *Diet, Demography, and Disease*, Aldine de Gruyter, New York, 201-217.

Van Loveren 2000 — C. Van Loveren, Diet and Dental Caries: cariogenicity may depend more on oral hygiene using fluorides than on diet or type of carbohydrates, *European Journal of Paediatric Dentistry*, 1 (2), 55-62.

Wahl 1988 — J. Wahl, Süderbrarup. Ein Gräberfeld der römischen Kaiserzaeit und Völkerwanderungszeit in Angeln, II. Anthropologische Untersuchungen, Wachholtz Verlag, Neumünster.

Walker 1986 — P. L. Walker, Porotic hyperostosis in a marine-dependent California Indian population, *AJPhA*, 69, 345-354.

Walker 1989 — P. L. Walker, Cranial injuries as evidence of violence in prehistoric southern California, *AJPhA*, 80, 313-323.

Walker 1997 — P. L. Walker, Wife beating, boxing and broken noses: Skeletal evidence for the cultural patterning of violence, in: D. Martin, D. Frayer (eds.), *Troubled times: Violence and Warfare in the Past (War and Society)*, Gordon and Breach, Amsterdam, 145-180.

Weaver 1980 — D. S. Weaver, Sex differences in the ilia of a known sex and age sample of fetal and infant skeletons, *AJPhA*, 52, 191-195.

Webb 1995 — S. Webb, *Palaeopathology of aboriginal Australians*, Cambridge University Press, Cambridge.

Wells 1964 — C. Wells, *Bones, bodies and disease*, Praeger, New York.

Wells 1975 — C. Wells, Prehistoric and historical changes in nutritional diseases and associated conditions, *Progress in Food and Nutrition Science*, 1, 729-779.

Ziegelmayer 1979 — G. Ziegelmayer, Die anthropologische Befunde, in: E. Keller (ed.), Das spätrömische Gräberfeld von Neuburg an der Donau, *Materialhefte zur bayerischen Vorgeschichte*, 40, Verlag Michael Laßleben, Kallmünz, 71-133.

LIST OF ILLUSTRATIONS