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Death and the body: using osteological methods to investigate the later prehistoric funerary archaeology of Slovenia and Croatia

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Abstract
This paper introduces the funerary practices of communities located between the south-east Alps and the Panonnian Plain during the Late Bronze Age and Early Iron Age. It will present a short review of funerary archaeology from the area in order to provide a context for the presentation of preliminary osteological results of skeletal remains from four cemetery sites. This pilot study provides an example of the data that will be collected as part of the ENTRANS Project, and how the use of osteological methods are advantageous for the investigation of identity and social structure in the past.

Keywords: Iron Age, south-east Europe, osteology, funerary practice, palaeopathology

Introduction

As part of the ENTRANS Project (see Chapter 1) the presentation of identity in funerary contexts from across modern-day Slovenia and northern Croatia is being investigated through the collection of osteological and isotopic data. In conjunction with these data, evidence from associated artefacts, grave type and landscape use will be examined to explore how expression of identity evolved over time.

This paper will begin with a brief introduction to the funerary archaeology of the study area during the Late Bronze Age and Early Iron Age. This will be followed by an overview of the sites from which both cremated and non-cremated skeletal material has been collected for the wider ENTRANS Project. This is followed by an introduction to the osteological methods which have been employed in analysis. Finally, a pilot osteological sample will be presented as an example of the data that will be collected throughout the project.

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Funerary archaeology of Slovenia and Croatia during the Late Bronze Age/Early Iron Age transition

The Late Bronze Age

The Late Bronze Age in modern day Slovenia and northern Croatia, as with much of the rest of central and western Europe, Scandinavia and parts of the Mediterranean, was characterised by a largely uniform burial rite (Harding 2000). This consisted of the cremation of the dead and subsequent deposition of funerary urns in large communal cemeteries, which have been labelled 'Urnfields'. The Urnfield period, which derives its name from these distinctive cemeteries, is thought to have spanned the 14th to the 9th centuries BC (BrC/D – HaB) (Teržan 1999; Dzięgielewski *et al.* 2010).

In the area under study, urnfield-type graves have been split into three categories based on the presence or absence of grave goods. These include graves without grave goods, graves with pottery only, and graves with bronze artefacts (Teržan 1999). In addition to pottery, grave goods associated with female graves include fibulae and, very occasionally, glass beads. The only bronze artefacts in male graves are primarily dress pins and occasionally razors. In the later phases of the Urnfield period, weapons including bronze spearheads and axes are very infrequently deposited in male graves, with exceptional examples known from the cemeteries of Mestne njiva and Kapiteljska njiva (both Novo mesto, Dolenjska) (Križ *et al.* 2009; Črešnar 2010, 82). It has been posited that the 'coded' occurrence of specific sets of objects in graves, notably ring jewellery (bracelets, anklets etc.), is related to a more elongated and defined female social hierarchy than that of the male sphere (Teržan 1999). Comparatively, male grave goods do not appear to reflect social hierarchy to any great extent, which has led to interpretations of a largely egalitarian male social structure. It may alternatively be argued that it was less important for male social status or position to be exhibited in the final grave deposit through the use of objects during this time (Harding 2000). As the cremation rite is an extended funerary practice with numerous stages, male identity or status may have been displayed at a time prior to the final deposition of remains (Brück 2009). For example, metal objects (particularly items of personal adornment) were commonly burned with the body and incorporated into the grave, a practice that is frequently found in contemporary urnfields across Europe. This suggests that the deceased was dressed in a similar way to inhumed individuals, with the body perhaps laid out

in a manner representing certain constituents of the individual's social persona on the pyre (Williams 2004). There is the probability that not all of these objects were subsequently selected for deposition, or that they may have been destroyed by the fire (Brück 2009).

The Early Iron Age

The transition to the Iron Age was accompanied by a significant change in funerary practice across modern-day Slovenia. During this time, the creation of Urnfield cemeteries ceased, though some locations, for example Kapiteljska njiva, continued to be used as cemetery sites. It was also at this time that inhumation graves and the construction of earthen mounds were introduced. These mounds could contain both cremated (usually in the earlier phases) and inhumed (particularly in the Dolenjska region) remains and were, in many cases, associated with a comparatively larger variety of grave goods (Frie 2012). It has been argued that this increase in the variety and quantity of grave goods corresponds with an increased level of social stratification expressed through these objects, as well as through the positioning of the grave in relation to the burial mound (Križ *et al.* 2009).

Contemporaneously in northern Croatia, Urnfield-type burials appear to persist well into the Iron Age, with continuity visible in the type and pattern of grave goods deposited (Ložnjak Dizdar 2009). In the 9th and 8th centuries BC, in a similar fashion to eastern Slovenia during the Late Urnfield phases, an increasing number of pottery and metal objects are included in northern Croatian burial assemblages – this has similarly been argued to suggest the emergence of a more stratified society containing wealthier individuals (Ložnjak Dizdar 2013; Teržan – Črešnar 2014). It is during this time that inhumation burials appear in northern Croatia, which is thought to be connected with outside influences from the south and east (Ložnjak Dizdar 2013).

The positioning of barrows within cemeteries, and subsequently the graves within the barrows themselves, has been argued to indicate that individual mounds represent a founding burial and subsequent decent group (Mason 1996; Dular – Tecco Hvala 2007, 78–85, 122–125). In the Dolenjska region, the earliest barrows contained a primary grave, which was frequently positioned in the centre. Secondary graves were then subsequently added over time. In the same region, the design of the barrows changed in the Hallstatt D period, where graves were constructed in concentric circles, commonly without a central grave.

(Mason 1996, 78–85; Križ 2012). These barrows have also been interpreted to represent "corporate decent groups", and could have been expanded to allow for a greater number of burials (Mason 1996, 79).

In addition to barrow cemeteries, the Iron Age funerary record is also represented by flat cemeteries and occasionally a mix of both barrow and flat cemeteries (Dular – Tecco Hvala 2007). These differ from the flat Urnfield cemeteries found earlier, in the Late Bronze Age, as they contain both cremation and inhumation deposits with an array of grave goods comparable to those deposited in barrow-only cemeteries (*ibid.*). This sudden change has been linked to abrupt transformations in economy and social structure, rather than large-scale immigration (Fokkens 2005). It has been argued that the development of a competitive iron-working economy is thought to have led to increased social stratification and wealth (Frie 2012). This is reflected in the burial record, with the introduction of valuable items, exotic grave goods and weapons (Wells 2007). In the areas included as part of the ENTRANS Project, it is during the Early Iron Age that the presence of bronze and iron weapons becomes more prevalent (Križ *et al.* 2009). This occurs in association with the creation of fortified hillfort settlements, with funerary assemblages suggesting the emergence of a male 'warrior' elite class (Dular – Tecco Hvala 2007). It has been argued that the wealthiest of these elites were also accompanied in the grave by armour, helmets, shields and belt fittings (Križ *et al.* 2009). Images (belonging to the tradition known as situla art; see Chapters 1 and 2) on belt plates and occasionally on horse riding equipment, such as spurs, have also been found in these graves (*ibid.*). Feasting and drinking sets are also a prominent feature of these burials, and were likely seen as status markers (Arnold 1999). These artefacts have been used to link these individuals with ceremonial activities, where their power would have been publicly displayed and maintained (Harding 2000).

Grave good assemblages suggest that Early Iron Age barrows contained the graves of both sexes and all age categories (Mason 1996, 78–85; Frie 2012). Extremely wealthy female burials are comparatively rare in relation to males and have thus far primarily been found close to large settlement centres, such as Preloge near Magdalenska gora, Griže near Stična, and Znančeve njive in Novo mesto (Dolenjska) (Dular – Tecco Hvala 2007). It is rare to find females occupying the central grave of a barrow, though examples have been reported from Kapiteljska njiva, Sajevce (Kostanjevica na Krki), Libna (Krško) (*ibid.*). Two elite female graves from Črnomelj dating to the Hallstatt C period were

furnished with bronze arm-rings, neck-rings, ankle-rings, fibulae and two gold diadem sets (Mason 1996, 65).

A number of these rich female graves also contained objects that have been associated with a ritualistic or religious class of women. These include ceramic and bronze vessels with animal head decoration, bronze sceptres, and glass and bronze items interpreted as amulets (Križ *et al.* 2009).

Materials

The ENTRANS Project study area includes regions of central and eastern Slovenia and inland northern Croatia. The sites span the Late Bronze Age and Early Iron Age and show a significant shift in funerary practice during this period.

In March 2014, a team from the University of Bradford visited the Dolenjska Museum in Novo mesto, the Institute for the Protection of Cultural Heritage of Slovenia, Novo mesto (Regional Office) and the Universities of Ljubljana and Zagreb. At this time, a rapid assessment was undertaken of 38 inhumation burials and 1076 cremation burials. These were assessed based upon the level of preservation, the availability of contextual information (such as grave location and associated grave goods), as well as the potential for good collagen preservation for isotopic analysis (see Chapter 7). Skeletal material from the study area frequently does not survive the harsh burial environments. Although some skeletons selected were well preserved, many were only moderately to poorly preserved, and generally incomplete. Following this process, 15 sites have been selected for further study, comprising 100 inhumation graves and 320 cremation graves (*Fig. 1*). Osteological analysis of 14 inhumation graves from four Early Iron Age cemeteries from central Slovenia and northern Croatia has been undertaken as part of a pilot study (*Fig. 2*). These individuals were chosen primarily based upon their levels of preservation and completeness. Preliminary results of these inhumations are presented below.

Cemetery sites included in the pilot study

Zagorje ob Savi

The site of Zagorje ob Savi has been recorded in the form of unpublished excavation reports (Draksler 2011; Murko 2011). The excavated area of the cemetery consists of flat, sub-rectangular graves orientated south-east to north-west. The majority of these graves were lined with large dolomite stones and had

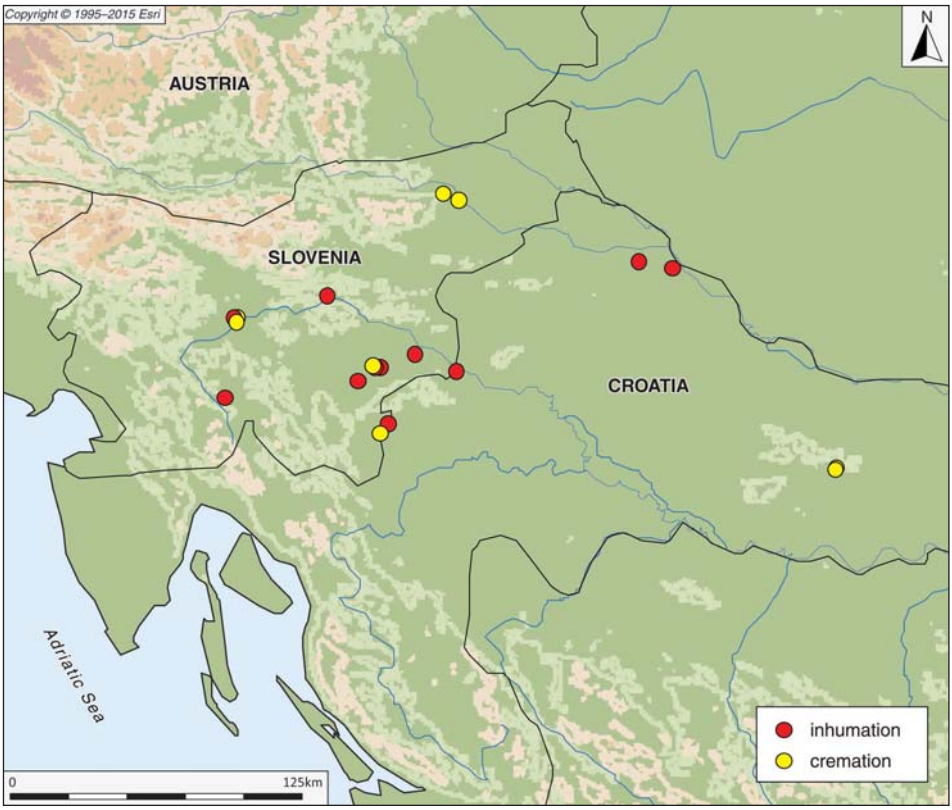

Fig. 1. Cremation and inhumation cemetery sites selected for further analysis during the rapid assessment

stone rubble on top. The grave goods recovered date the site to the Early Iron Age. The skeletons were positioned supine with their arms and legs extended. One grave (grave 5) exhibited evidence of a wooden lining and perhaps covering. Two infant graves were found in very close proximity to each other. With the exception of their smaller size, the graves were constructed in an identical fashion to that of the adult graves. The preservation of the skeletal material from this site was generally poor. This was probably due to the sandy and acidic soils, but also because of frequent disturbance and destruction from the building of utilities in the recent past.

Fig. 2. Cemetery sites included as part of the osteology pilot study

Ljubljana Congress Square (Ljubljana)
Three non-adults and one adult were found at this site. These inhumation graves were found in the vicinity of an Early Iron Age barrow, which contained cremated remains (Horvat – Novšak 2011). As recorded in unpublished excavation reports, the individuals from this site were accompanied by both ceramic and metal grave goods (*ibid.*).

Torčec Međuriče (Podravina, northern Croatia)
One individual was excavated during a trial excavation of a lowland settlement site. The skeletal remains were well preserved and almost complete, though very fragmentary. The individual was discovered in the upper layer of a pit, in a tightly crouched position directly beneath the ploughed soil layer (Kovačević

2009). Severe plough damage is consequently a probable cause for the high level of fragmentation observed. The date of these skeletal remains is uncertain – nevertheless it is hoped that future radiocarbon dating will provide more clarity.

Sv. Petar Ludbreški (Podravina, northern Croatia)
Two individuals from this site were analysed; one was excavated by K. Vinski-Gasparini (from the Archaeological Museum in Zagreb) in 1960 and the second was discovered in the periphery of the Early Iron Age settlement during an excavation led by M. Šimek from Gradski muzej Varaždin in 1978. Unfortunately, very little information survives regarding their contexts. However, it does seem that these two individuals were associated with a settlement site, rather than a cemetery. Both individuals were excavated from pits and were reported to have been buried in a crouched position. They were both associated with Early Iron Age pottery. The male recovered in 1978 was also buried with a large grindstone (S. Kovačević pers. comm.).

Methods

Preservation and completeness

For many of the sites under investigation, including those presented as part of this pilot study, the level of preservation of skeletal material is a key consideration. Poor preservation can limit the nature of information gleaned from osteological analysis. The soil conditions within the study area are predominantly highly acidic, which has led to the complete destruction of many skeletons. The skeletal remains examined as part of the ENTRANS Project have been similarly compromised by these adverse conditions, leading to cortical exfoliation, root etching and water damage, as well a variable (usually poor) level of completeness. This will have a considerable effect on the age and sex data available, as well as on the ability to recognise pathological lesions. It should be noted that the term ‘preservation’ refers to the condition of the bone itself, for example, the level of post-mortem damage to the cortical surface, weathering, colour change or loss of the organic component (e.g. collagen). The level of bone preservation, in this case, is unrelated to the completeness of the remains (i.e. what percentage of the skeleton survives), or how fragmented the skeleton is. The following constitutes

a selection of methods utilised for the analysis of human remains, where the preservation of the individual was sufficient to allow for their application.

Minimum number of individuals

The minimum number of individuals (MNI) is a useful method for the identification of multiple individuals, or when dealing with a collection of co-mingled remains. Here, this method was used for the identification of multiple individuals from a single grave, urn or other context.

Biological sex

The assessment of biological sex is based upon the observation of specific, sexually dimorphic, traits which develop during puberty, but which are most visible post-puberty. For this reason, biological sex was only assessed for adult individuals.

Sexually dimorphic traits are argued to be most reliable in the pelvis, as differences between males and females are caused by the need to facilitate childbirth (SCHEUER – BLACK 2000). Sexually dimorphic traits are also observable in the skull and can be used in conjunction with pelvic traits to carry out an assessment of biological sex. The following traits/methods were utilised for the analysis of biological sex: greater sciatic notch, pre-auricular sulcus (WALKER 2008), ventral arc, sub-pubic concavity, ischiopubic ramus (PHENICE 1969; KLALES *et al.* 2012), nuchal crest, supra-orbital margin, glabella, mastoid process, mental eminence (BUIKSTRA – UBELAKER 1994; WALKER 2008), parietal eminences, posterior zygomatic arch, the shape of the orbits and orbital margins, gonial angle and presence or absence of gonial flaring (BROTHWELL 1981, 59–61; İŞCAN – STEYN 2013, 160–169).

Biological age

The estimation of biological age becomes less precise as the age of an individual increases. For non-adults (c. <20 years), the estimation of age is carried out through the observation of stages of skeletal and dental development. This has been shown to occur in a largely uniform and predictable fashion, with bones fusing at particular times and the development and eruption of teeth, in particular, happening at well-documented ages. Once all of the bones have fused, it becomes

more difficult to estimate the biological age of an individual, as methods rely more heavily upon degenerative changes, particularly around the joint surfaces. These changes are more likely to be influenced by extrinsic factors such as disease, activity and the environment (Mays 2015). The effects of post-depositional change and taphonomy can also be a barrier to analysis, where joint surfaces have been destroyed or diagnostic bone elements are missing. *Fig. 3* provides a list of methods used for the estimation of biological age, which were selected where completeness and preservation levels allowed for their application. Dental wear (Brothwell 1981) was used with caution due to a lack of published, calibrated, population-specific standards.

Non-adults	
Dental atlas of development and eruption	AlQahtani 2010
Fusion of epiphyses	Scheuer – Black 2000
Long bone length (foetal remains)	Scheuer *et al*. 1980
Long bone length (infants to older children)	Maresh 1970; Scheuer – Black 2000
Adults	
Age-related change of the pubic symphysis	Brooks – Suchey 1990
Age-related change of the auricular surface	Buckberry – Chamberlain 2002
Cranial suture closure	Meindl – Lovejoy 1985
Dental wear	Brothwell 1981

Fig. 3. List of methods utilised for the estimation of biological age

Supporting evidence was taken from late fusing epiphyses, such as the sacral bodies (Belcastro *et al.* 2008), iliac crest and the medial clavicle (Webb – Suchey 1985), which can be used as a further method for the age estimation of younger adults. These methods will be useful for the narrowing the age ranges of young adult individuals, which could include individuals in their late teens, who have ceased growth in height (i.e. complete fusion of long bone epiphyses) (Scheuer – Black 2000, 468).

Due to the generally poor correlation found between the estimated biological and actual age of known age-at-death adult skeletons in other studies, coupled

with consideration of the very poor preservation of the skeletal material included in this study, broad ranges of young, middle and mature adult were considered more appropriate than numerical age ranges (*Fig. 4*) (BUIKSTRA – UBELAKER 1994). These ordinal categories better reflect biological rather than chronological age and facilitate the comparison of populations. For individuals who were observed as being an adult, but where more precise estimation of biological age was not possible, a category of adult (c. 20+ years) was used. Age ranges for non-adults are also quoted in *Fig. 4*.

Term	**Age range**
Non-adult (adapted from SCHEUER – BLACK 2000, 468)	
Infant	from birth to the age of 1 year
Early childhood	c. 1–6yrs
Late childhood	c. 7–12 years
Adolescence	13–19 years
Adult (BUIKSTRA – UBELAKER 1994)	
Young adult	c. 20–35 years
Middle adult	c. 36–50 years
Mature adult	c. 50+ years

Fig. 4. Definition of age ranges

Additional methods

In some rare cases it has been possible to estimate the stature (height) of an individual from the presence of a complete long bone. Due to the fragmentary nature of the assemblage, the regression method by TROTTER (1970) was chosen over a full skeletal assessment.

Preliminary results

The preliminary results from the Early Iron Age cemeteries of Zagorje ob Savi, Ljubljana Congress Square, Sv. Petar Ludbreški and Torčec Međuriče are presented here. The demography for all of the cemeteries is shown in *Fig. 5*.

All age groups, with the exception of early childhood, adolescence and mature adult, were represented in the sample. Both sexes were also represented, with 43% assessed as male and 14% assessed as female. 43% of the individuals analysed were non-adults, and therefore were not assessed for biological sex. Of all of the adult age categories, middle adult was most prevalent (75%), followed by young adults (25%). It is commonly recognised, however, that the middle adult category is often over-represented in archaeological populations due to the biases associated with age estimation methods (BUCKBERRY 2015). Moreover, it is common in archaeological assemblages, particularly those which are poorly preserved, to find an under-representation of female and mature adult remains (WALKER *et al.* 1988).

Seven individuals were examined from the site of Zagorje ob Savi. The assemblage produced the highest percentage of infant burials and the only two female individuals identified in this pilot study (*Fig. 5*). Due to the survival of dentition, it was possible to assign an age of c. 7.5 months to the most complete infant. An additional right orbit was recovered in association with this individual, giving this grave a MNI of two.

AGE & SEX	Infant	Early Childhood	Late Childhood	Adolescence	Male Young Adult	Female Young Adult	Male Middle Adult	Female Middle Adult	Male Mature Adult	Female Mature Adult
Zagorje ob Savi	3				1	1	1	1		
Ljubljana Congress Square	1		2				1			
Torčec Međuriče							1			
Sv. Petar Ludbreški							2			

Fig. 5. Results of osteological analysis of age and sex

From Ljubljana Congress Square, the stature of the only middle adult male could be calculated from the length of the radius as 153 ± 4.32cm in height. The presence of eburnation, osteophytes and porosity on the left articular processes of the lower cervical vertebrae represent evidence for osteoarthritis. Further

eburnation and osteophytes (indicative of osteoarthritis) were noted on the left articular processes of the upper thoracic vertebrae. Porosity, suggesting joint degeneration but not osteoarthritis, was also noted on the articular surface of the left acromio-clavicular joint.

The remains from a second grave were found to have a MNI of three. Based upon the developmental stages of the two almost complete sets of dentition, two of these individuals were estimated to be approximately 9 and 10.5 years of age. The third individual was estimated to be less than one year old due to the size of the elements present. This grave, therefore, contained the remains of multiple children, without evidence for an associated adult. Enamel hypoplasia was identified on the canines of both the older non-adults. Additionally, cribra orbitalia was noted in the orbits of the c. 10.5 year old individual. This condition has been linked to disease, but also to metabolic stresses, such as anaemia or vitamin deficiency. Without more evidence, it was not possible to discern the cause of this lesion.

The three individuals from Croatia were all assessed as male. From the grave at Torčec Međuriče, the remains fell into the middle adult category. Stature was estimated to be 168 ± 4.05cm based on the left humerus. The inclusion of a possible foetal long bone was also noted.

From the two graves at Sv. Petar Ludbreški, the stature of the male excavated in 1978 was 167 ± 4.32cm, based on the total length of the radius. Due to incompleteness and fragmentation, the stature of the second male (1960) could not be calculated.

Trauma was noted on the femora of both individuals from this site. The right femur of the individual excavated in 1960 exhibits a united and well-healed ante-mortem fracture to the proximal third of the diaphysis. This has caused an anterio-medial displacement of the neck and head. The malalignment of the femur would have caused a slight shortening of the limb, which would have probably resulted in a limp. The bone has not atrophied and no other asymmetry was noted, suggesting that this individual continued to use the limb.

The male excavated in 1978 has evidence of a peri-mortem fracture to the proximal third of the diaphysis of the left femur, inferior to the greater tuberosity. No other fractures were observed.

Discussion

The aim of this pilot study was to consider the kinds of information available from the skeletal remains of Early Iron Age inhumation graves from modern-day Slovenia and northern Croatia. A primary aspect of this was to test whether age and sex information would be available for comparison with material evidence from graves, in order to consider themes of identity as expressed through mortuary practice. From the results so far, it is predicted that this will be possible.

It is important to note that the dataset presented here is likely to be compromised by levels of preservation and sample size. The skeletal material was selected purposefully for being the best preserved from locations where bone does not often survive. This profile is consequently unlikely to reflect the cemetery or living populations of the time period under consideration. The graves excavated at Zagorje ob Savi and Ljubljana Congress Square are probably only a small sample of a much larger cemetery site, and are therefore also not reflective of the original cemetery population. Even in such a small sample, however, both sexes were represented and it is apparent that inclusion in flat and barrow cemeteries was not restricted to a particular age group. Furthermore, the individuals from the Croatian site of Sv. Petar Ludbreški differ to that of the Slovenian cemeteries, as they were buried in couched positions in pits. These pits were found near or within settlement sites, rather than within formal, delineated burial grounds. This burial format would have been a deliberate choice, made on the part of the living. This could have been related to regional variation in burial practice, ideas of formalised belief, or may be evidence of a deviant burial rite. These theories shall be investigated further as the project progresses.

The two males from Sv. Petar Ludbreški are also interesting in the fact that they both suffered trauma to their femora. These fractures may have been caused by blunt force trauma, which may or may not have been accidental. The identification of femoral fractures is rare in the archaeological record and are more frequently noted in children and mature adults, in particular post-menopausal females where the bone structure has weakened (Astrom *et al.* 1987; Judd – Roberts 1998; 1999). In modern times, fractures to the femoral shaft in young and middle adults are more commonly associated with high-energy trauma, such as road accidents, which result in a severe direct or indirect force to the limb (Lovell 1997; Weiss *et al.* 2009). The identification of two femoral fractures from two middle adult males is therefore interesting, as it occurs relatively rarely in prehistoric contexts.

From this small sample of individuals, evidence for joint disease and trauma has been observed from the sites of Ljubljana Congress Square and Sv. Petar Ludbreški. However, for the most part, there appears to be little evidence for the occurrence of chronic disease across the sample. This may be linked to the size of the sample, and the analysis of the remaining c. 80 inhumation burials will provide further insight into the prevalence rates of disease.

Conclusion

The use of osteological methods to investigate unburnt skeletal remains from four sites in Slovenia and Croatia has provided a glimpse into the demographic of those individuals buried in Early Iron Age cemeteries. Although the dataset presented is limited, these preliminary results suggest that formal burial at this time was accessible to both males and females, as well as to adults and children. This supports the evidence from grave goods that has also been presented in this paper.

The examination of these skeletal remains has led to the creation of individual biographies, such as the case of the healed fracture of the femur belonging to the male buried at Sv. Petar Ludbreški, Croatia, and the middle adult male suffering from osteoarthritis, buried at Ljubljana Congress Square. As the project progresses, it is anticipated that more data of this kind will allow for the multi-scale investigation of identity and social structure during the Late Bronze Age and Early Iron Age in this region.

Further work

Following the same methods as those outlined above, further osteological analysis will be undertaken for the remaining Slovenian inhumation sites: Križna gora (Urleb 1974; Teržan – Črešnar 2014), Grofove njive (Teržan – Črešnar 2014), Dolge njive (Mason 2009), Družinska vas, Metlika/Hrib (Grahek 2004; Frie 2012), Novo mesto/Kapitelska njiva, Obrežje (Mason 2009) and the Croatian Iron Age cemetery at Sv. Križ (Cvitković – Škoberne 2003).

Future analyses will also compare biological assessments of age and sex with that of grave good assemblages. In the past, biological sex assessment of an individual (based upon the physical examination of the remains) has not been routine. It has instead become practice to assign age and sex through the presence of specific, 'gendered' grave goods or types of grave good assemblages. For

other areas and time periods these assumptions have proven problematic, with individuals found to be buried with grave goods more routinely associated with the opposite sex, albeit at a low frequency. The term 'gender' refers to cultural understanding of appropriate roles and functions of a particular individual (Hollimon 2011). This might include sanctions or restrictions on certain spheres of society, or access to specific events and assemblages of material culture (Arnold 1995). Consequently, a person's gender attribution is a culmination of biological, social and material criteria, which are used by members of a society to identify others as male/female, or sometimes 'other'. This ascription can change over time and does not necessarily match the attribution made at birth through the observation of an individual's biological sex (*ibid*.). If, therefore, the attribution of gender to past individuals is not necessarily linked to their biological sex, then the assignment of sex based on the presence of certain 'gendered' grave goods is unreliable; especially where skeletal material does not survive. The categorising of items into strictly male/female groups restricts the understanding of past societies to a modern, westernised perception of gender systems (Weglian 2001). This neglects the possibility of gender variation and categories that may not reflect the biological sex of the individual in question (*ibid*.). This project aims to investigate the relationship between gendered grave goods and biological sex in the East Alpine region during the Late Bronze and Early Iron Age.

The majority of cemetery sites included as part of this research comprise cremation graves, dating to both the Late Bronze Age and Early Iron Age. The osteological analysis of over c. 320 sets of cremated remains from the Slovenian cemetery sites of Ljubljana SAZU (Teržan – Črešnar 2014), Ljubljana Congress Square, Kapiteljska njiva and Podzemelj, as well as the Croatian site at Kaptol (see Chapter 3) (Potrebica 2013, 69–73), will be carried out following methods adapted from those utilised for the analysis of inhumed individuals. The methods will acknowledge the greater fragmentation, poor preservation and completeness of the assemblages, variables that can significantly affect the data recovered from the analysis of cremated human remains. Incomplete recovery of the individual both from the pyre and during excavation of a grave can pose problems when assessing the minimum number of individuals present, as well as age and sex estimations. In many cases, it should be possible to distinguish between adults and non-adults, with unfused epiphyses still visible and un-erupted teeth tending to survive in the jaw (Mays 1998, 214; McKinley 2000, 410).

These cremated individuals will also undergo further analyses, including the recording of weight, colour and level of fragmentation. This will indicate the

level of oxidation of the bone, which in turn will indicate the effectiveness of the cremation process. The level of oxidation is related to time, temperature and the fuel used. In addition to oxidation, the weight and fragmentation of the cremated remains are suggestive of the proportion of the body represented in the final grave deposit. The total cremated remains of an adult can weigh between 2000 and 3000g, but this has been known to vary in archaeological samples. For example, McKinley (2013) suggests that only 40–60% of the expected bone weight for an adult is generally found in the UK from Late Iron Age cremations, and that Iron Age graves in the British Isles tend to have lower weights than those dating to the Bronze Age.

From this kind of investigation, ideas regarding how the body was viewed post-cremation can be inferred. For instance, was it important for the whole person to be buried? Or were a few chosen elements from the pyre sufficient to represent the deceased? Patterns in the frequency of particular elements identified, such as crania, axial skeleton (ribs, vertebra etc.) or long bones, can be examined in regard to these questions.

All osteological data will be combined with evidence from both isotopic data (see Chapter 7) and contextual evidence from settlement and mortuary contexts, in order to yield more detailed interpretations regarding the identity of those living between the south-east Alps and the Panonnian Plain during the Late Bronze Age and Early Iron Age.

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