Deliberate selective deposition of Iron Age cremations from Oosterhout (prov. Noord-Brabant, the Netherlands)

Veselka, B.; Lemmers, S.A.M.

LUNULA. Archaeologia protohistorica, XXII, 2014, p. 151-158.

Deliberate selective deposition of Iron Age cremations from Oosterhout (prov. Noord-Brabant, the Netherlands): a 'pars pro toto' burial ritual

Barbara Veselka[1] & Simone Lemmers[1,2]

1. Introduction

Lifeways of individuals from past populations can be reconstructed by using demographic information that can be provided by human remains. The human body, including bones and teeth, is influenced by numerous biocultural factors during life. Therefore, bones and teeth can be highly informative about a person's age, stature, sex, activities, diet, and health. The funerary practice of cremation, however, changes the appearance and consistency of bone, which makes demographic analysis difficult after archaeological recovery. Due to heat, bone will shrink, fragment, cracks will occur, and changes in color can be observed. On the other hand, these heat induced changes can provide information about the way the cremation process was performed. Furthermore, the context of a burial provides insight in the deposition of the bone material, and enhances our knowledge of taphonomic factors and the performed burial rituals that influenced the cremated remains.

Cremation is an important way of treatment of the deceased in many cultures and the earliest cremations in Europe can be dated to the Mesolithic. In the Netherlands, cremating the dead becomes the norm during the Metal Ages and the Roman Period (Roymans & Kortlang 1999). This paper presents a case study of a sample of the collection of Oosterhout, the Netherlands. The sample for this paper has a relative large amount of grave goods, including miniature urns containing burned human remains. These small urns are an excellent example of a *pars pro toto* ritual, which is performed in various cultures through time (Fontijn *et al*. 2013; Gonçalves *et al*. 2010; Millaire 2004; Stratouli *et al*. 2010). Compared to other Dutch collections were *pars pro toto* can be observed, the Oosterhout assemblage seems to have the largest amount of miniature urns (Cuijpers 2009b; Cuijpers 2009c; Roymans & Hoogland 1999: 74-77; Lemmers 2012a; Lemmers 2012b; Tol 1999; Veselka, Lemmers & Hoogland 2013). This research contributes to our understanding of Iron Age burial rituals and improves our knowledge of the various ways the *pars pro toto* ritual was performed.

The analyzed collection comes from the site Compensatiebos Vrachelen 4 in Oosterhout, situated in the south-east of the Netherlands. Oosterhout was excavated in three excavation campaigns, being 2008, 2010 and 2012. In 2008, one grave was excavated consisting of at least 1 cremated female individual (Bink & Dyselink 2009, 22-25). In 2010, a total of 77 cremations were excavated (Roessingh & Blom 2012: 57-89). The last part of Oosterhout was excavated in 2012 and a total of 58 cremations were retrieved. The collection consists of 41 cremations excavated including the surrounding fillings, 8 urn cremations with the urns still intact, and 9 cremations, which contain small amounts of loosely collected bone fragments and were not further analyzed. For this paper, 49 of the 58 cremations were analyzed by the first author and are discussed in more detail. Although the 49 cremations belong to the same site, they differ in some aspects from the cremations excavated in 2008 and 2010, and comparisons with the sample of 2010 will be made.

Excavations revealed settlements dating from the Early Bronze Age up to the early Medieval period, from about 2000 B.C. to the beginning of the 10th century (Roessingh & Blom 2012). The 49 cremations analyzed for this paper are dated to the Middle Iron Age up to the Early Roman Period. However, only 24 of the 49 cremations were suitable for demographic analysis. Sixteen cremations were presumably buried with an organic or ceramic container, and eight cremations with an urn still intact.

The material from the cremation burials was divided into two fragment categories: a large fraction (10+ mm) and a small fraction (3-10 mm) according to the standards by Maat (1997) and the weight of these fractions was recorded. In addition, the maximum size and average size of the fragments was measured. Then, the large fraction was divided into several skeletal categories: the neurocranium (part of the skull that contains the brains), the viscerocranium (facial part of the skull), the axial skeleton (clavicle, scapulae, vertebrae, ribs, pelvis, and sacrum), the diaphyses, the epiphyses (joints), and a category for indeterminable fragments. The small fraction was searched for small skeletal elements, such as dental roots and phalanges, which could be indicative of the completeness of the cremated individual (Wahl 2008). McKinley (1989: 68) reported the weight proportion of the skeletal categories in unburned human remains to be: 18% cranium (neurocranium and viscerocranium), 23% axial, en 59% extremities (diaphysis and epiphysis). However, a shift in proportions is expected due to heat induced changes of the bone and the influence of post-depositional processes. In particular, the percentages of the axial skeletal parts and the epiphyses will be lower due to the relative high percentage of trabecular bone and the thin cortices.

For each cremation the degree of combustion was noted and differences between and within skeletal categories were reported. Figure 1 provides an overview of heat induced changes which can be observed per combustion degree.

[1] Human Osteoarchaeology Laboratory, Faculty of Archaeology, Leiden University, the Netherlands. E-mail: barbaraveselka@gmail.com
[2] Department of Anthropology, Durham University, United Kingdom.

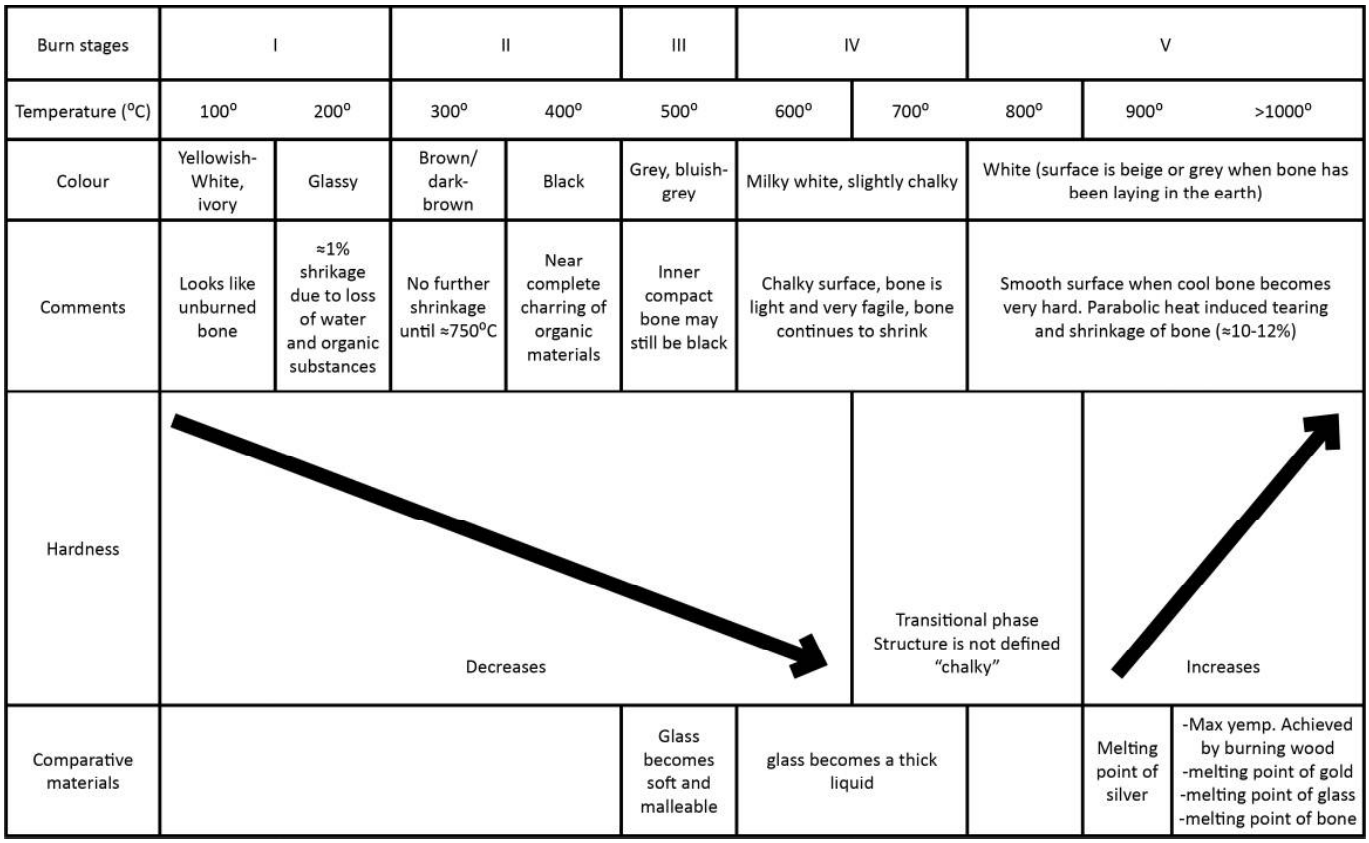

Fig. 1. Combustion degrees and the heat related changes (Lemmers 2011, figure 7 redrawn from Herrmann 1988, figure 274; Trautmann 2006, figuur 18; Wahl 2008, table 9.1).

The presence of multiple unique skeletal elements, such as the petrous part, is used to determine the minimum number of individuals (MNI) for each cremation. Additional indicators are differences in robusticity, although this indicator is more reliable in distinguishing adult from subadult remains, and the total weight of the cremation. However, weight is considered to be less reliable.

For the age-at-death estimation of subadults, stages of epiphyseal fusion (Shaefer, Black & Sheuer 2009), dental development (Demirjian, Goldstein & Tanner 1976; Moorrees, Fanning & Hunt 1963), and dental eruption was used (Ubelaker 1979). Age-at-death estimation of adults was performed using the methods developed by the Workshop of European Anthropologists (1980), Acsádi and Nemeskéri (1970), and White, Black & Folkens (2011), which is based upon the degree of degradation of the auricular surface and the pubic symphysis, and the stages in cranial suture closure. This last method is considered to be the least reliable aging method, where closed sutures provide more information than open ones (Herrmann 1990; Lemmers 2011; Mays 2010). However, the cranial bones often are preserved relatively well in comparison to other skeletal elements in cremations and therefore the stages in suture closure frequently are the only macroscopic method for aging the individual. Thus, the age-at-death estimations will have broad ranges. All individuals were assigned to age categories based upon Grosskopf (1999: 39) as shown in table 1.

Sex is estimated by using the same morphological aspects as are used for the analysis of inhumations. In particular the features of the pelvis and the skull are used, as described by Acsádi and Nemeskéri (1970) and WEA (1980). Additional methods include the morphology of the petrous part, which is often preserved in cremated remains due to its robusticity (Wahl and Graw 2001), but give less reliable results and were not used in this paper. Sex is only estimated for adults, since estimation of sex is considered to be unreliable in subadults (Mays 2010), although recent research of Osipov et al. (2013) seems to provide new possibilities. Table 2 provides an overview of abbreviations and the corresponding estimations.

Category	**Corresponding age**
Neonate	< 1 year
Infant 1	0 – 6 years
Infant 2	7 – 12 years
Juvenile	13 – 18/19 years (subcategory 15+)
Adult	20 – 40 years
Mature adult	40

Table 1: age categories after Grosskopf (1999: 39).

For each cremation, possible pathological conditions will be reported as described by Aufderheide and Rodríguez-Martín (1998) and Waldron (2009).

2. Results

To determine the degree of fragmentation for each of the 49 cremations, both maximum and average fragment size was measured. Figure 2 shows the degree of fragmentation in all cremations.

Term	Symbol	Meaning
Female	F	Sex estimation with certainty based on 3 morphological aspects.
Male	M	
Female?	F?	Sex estimation with less certainty, based on less than 3 features.
Male?	M?	
Indeterminate	I	Indeterminate based upon available morphological features.
-	-	Not applicable. Sex can not be estimated in subadults.

Table 2: Abbreviations and corresponding estimates (White 2011, 408).

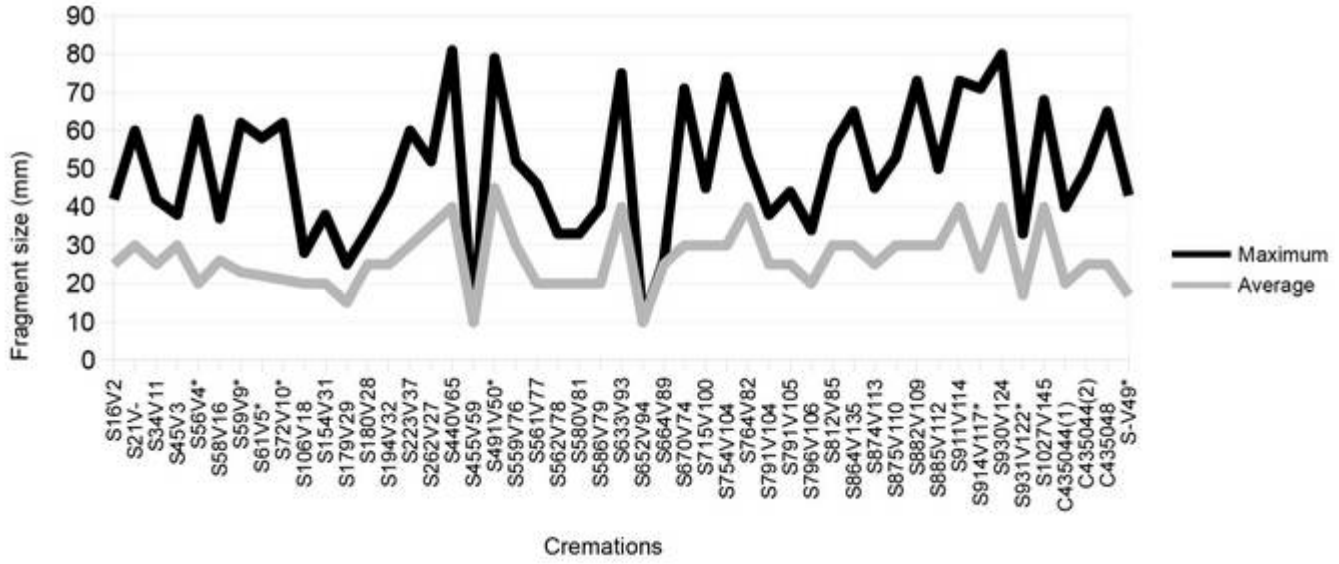

Fig. 2. Degree of fragmentation of 49 cremations. Cremations marked with an asterisk are urn cremations with the urn still intact.

The weight of the large fraction (10+ mm) and of the small fraction (3-10 mm) was determined. Figure 3 shows the total weight of each of the 49 cremations divided into two fractions.

The average combustion degree was V, although some cremations had combustion degrees ranging from III to V. However, due to the fragmentary nature of these cremated remains, it was not possible to determine whether a pattern in combustion degree could be observed.

Numerous grave goods were found, varying from metal fragments to miniature urns. Table 3 provides an overview of cremations which had a miniature urn included. In addition, the

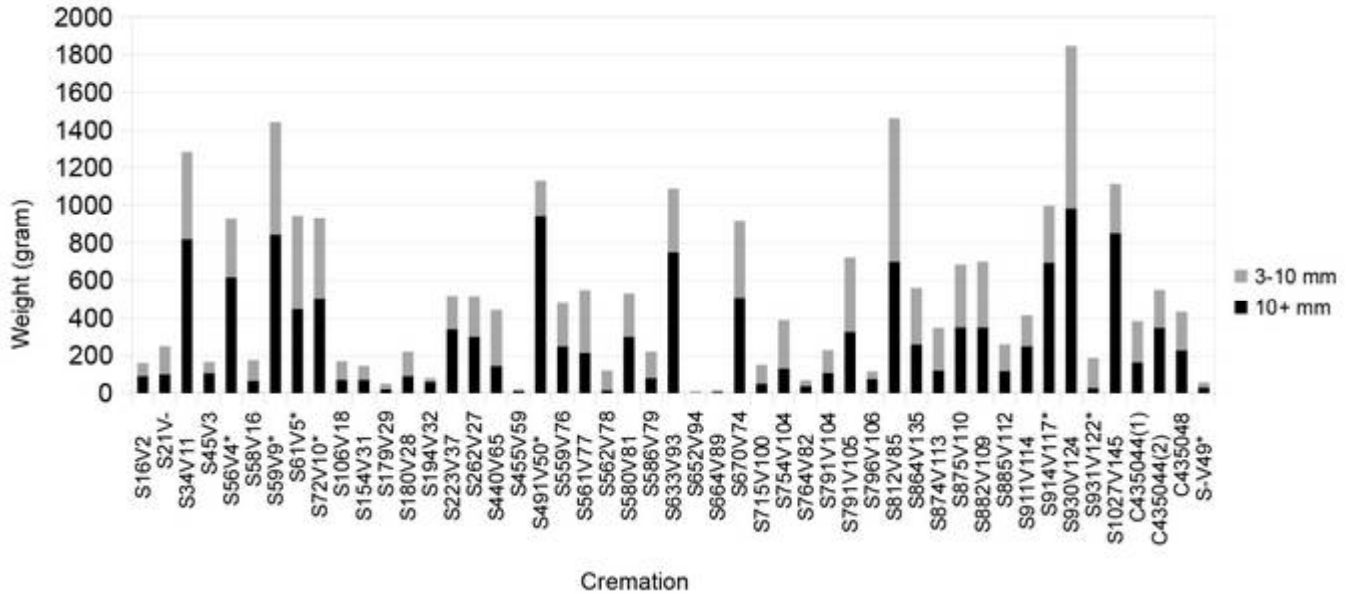

Fig. 3. Total weight divided into a large and small fraction. Cremations marked with an asterisk are urn cremations with the urn still intact.

Cremation	Weight of content (g)	Skeletal category
S21V-	1.5	diafyses
S34V11	0.1	indeterminate
S72V10*	11	diafyses, indeterminate
S791V104	unobservable	unobservable
S864V135	unobservable	unobservable
S914V117*	0.5	indeterminate
S931V122	15	neurocranium, axial skeleton, indeterminate
S1027V145	unobservable	unobservable
S-V49	0.5	unobservable

Table 3: overview of cremations with miniature urns.

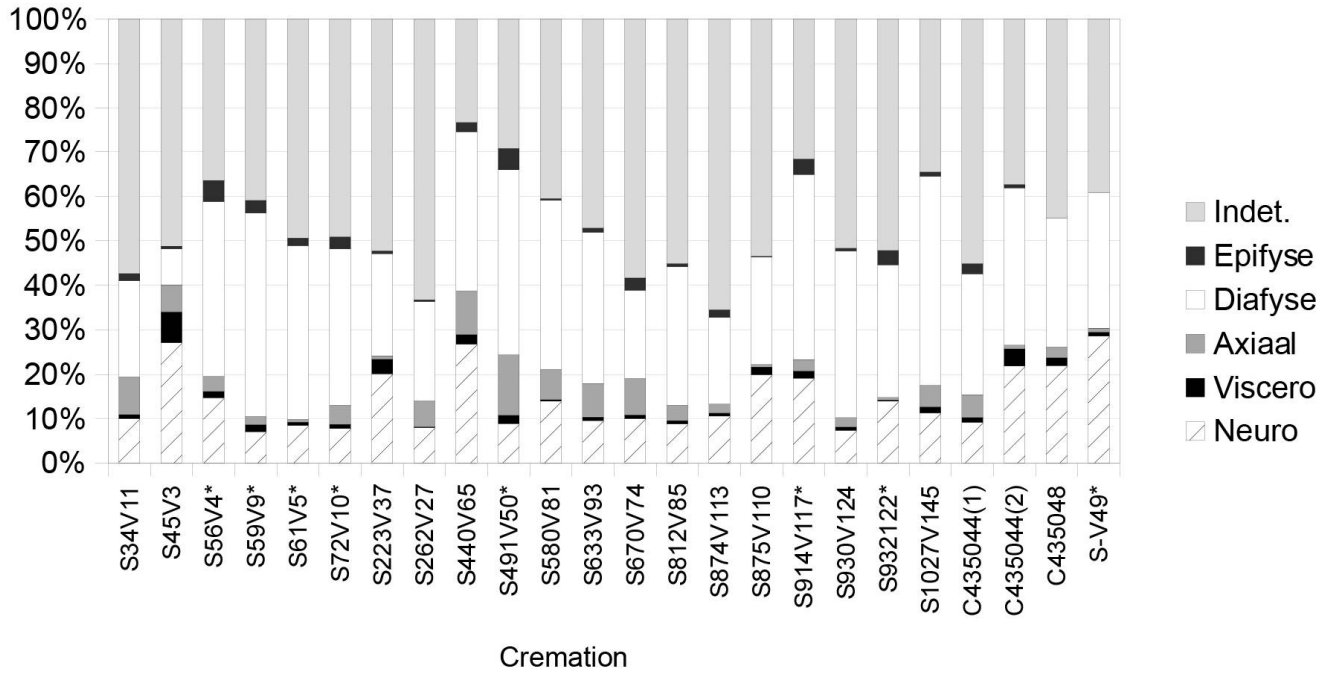

Fig. 4. Proportions of skeletal categories of total weight. Cremations marked with an asterisk are urn cremations.

weight of the content and, if possible, the skeletal category of the bone fragments is noted.

The proportions of skeletal categories of the total weight were determined for the 24 cremations that were suitable for demographic analysis and are shown in figure 4.

The minimum number of individuals was 1 per grave, except for cremation S812V85. In this cremation two unique skeletal elements could be identified, two left petrous parts, implying a MNI of 2.

The results for sex and age estimation are shown in table 4. Table 5 shows the demographic structure of the remains. The two infant categories were combined as were the adult and mature adult categories.

Individual S59V9 showed evidence of several pathological conditions. Periodontitis of the maxilla was observed together with ante mortem tooth loss of the first right upper molar and second right upper incisor. This individual also suffered from osteoarthritis of the spine, visible as lipping of the articular facets and the presence of marginal osteophytes (Waldron 2009, 34).

Individual S812V85 showed lipping of the articular facets of the spine which can be attributed to osteoarthritis.

On the exterior surface of the cranium of individual S875V110 porotic hyperostosis was noted.

3. Discussion and Conclusion

The average fragment size of the 49 cremations is relatively small (15 – 25 mm). This can be expected since the area of deposition has experienced a large amount bioturbation including root activity. A high degree of fragmentation impaired demographic analysis and resulted in 24 out of the 49 cremations suitable for analysis.

As shown in figure 2 the average fragment size of the urn cremations is smaller than that of the other cremations. This is remarkable since the urn is expected to provide protection from taphonomic processes, such as pressure from the soil,

Cremation	Sex	Age	Cremation	Sex	Age
S34V11	F	Adult	S670V74	F?	Adult
S45V3	–	Infant 2	S812V85*	F?	Mature adult
S56V4	M	Adult	S874V113	–	Infant 2
S59V9	M	Mature adult	S875V110	M	Adult
S61V5	M	Adult	S914V117	M?	Adult
S72V10	M?	Adult	S930V124	M?	Adult
S223V37	F	Adult	S931V122	–	Infant 2
S262V27	I	Adult	S1027V145	M	Adult
S440V65	M?	Adult	435044(1)	–	Infant 2
S491V50	M	Adult	435044(2)	M	Adult
S580V81	M?	Adult	435048	M?	Adult
S633V93	F	Adult	S-V49	–	Infant 1

Table 4: overview of sex and age estimations. (*) and another left petrous part of an indeterminate adult.

	Number
Subadult (0-18)	5 (20%)
Adult female	5 (20%)
Adults male	13 (52%)
Adult indeterminate	2 (8%)

Table 5: demographic structure.

which would result in larger fragments. The reason for this is unclear, although local variations in root activity might have contributed to a lower average fragment size. The degree of fragmentation of the 77 cremations of 2010 was higher than the degree of fragmentation of the 49 cremations presented in this paper. The average weight of the large fraction (10+ mm) of the 77 cremations was 116 grams and that of the 49 cremations 222 grams, and most of the 77 cremations were not suitable for demographic analysis (Roessingh *et al*. 2012).

McKinley (1993) noted the weight range of a complete cremation to be between 1001,5 and 2422,5 grams with an average of 1625 grams. The average weight of the 49 cremations is 448 grams, which is notably lower than the average weight of a complete individual as reported by McKinley (1993). Smits (Roessingh *et al*. 2012) reported an average weight of 228 grams. The difference in average weight between the two samples from Oosterhout is striking.

Several factors can influence the total weight of a cremation. Taphonomic processes, such as animal burrowing, root activity, pressure of the soil, but also deliberate fragmentation of the burned remains (Sigvallus 2005, 413), and the process of selective deposition can affect total weight.

As mentioned, a lot of root activity was noted, destroying the remains and is likely to have contributed to the decrease of weight. All skeletal categories were represented in most of the 24 analyzed cremations. Even small skeletal elements, such as dental roots and phalanges, could be retrieved. Thus implying that care was exercised in collecting the burned remains. Deliberate fragmentation of the bones does not seem to have been a contributory factor to the degree of fragmentation nor to the total weight of a cremation. However, selective deposition and manipulation of bone material seems to have been part of the burial ritual performed in Oosterhout. This ritual of selective deposition has been observed at other sites from different times and cultures (De Mulder, Van Stydonck & De Clercq 2013; Fontijn et al. 2013; Gonçalves *et al*. 2010; Millaire 2004; Stratouli *et al*. 2010), where it is referred to as a *pars pro toto* ritual, in which a part of something (part of a human, part of an object) could be interpreted as representing something larger (a complete individual, a complete object). The practice of selective deposition in cremation burials can be observed in the Netherlands already during the Bronze Age as reported by (amongst others) Lemmers (2012a). It is also present in the Iron Age. An iconic example of *pars pro toto* in the Netherlands can be observed in Oss-Zevenbergen, where a single bone fragment was buried in a large burial mount together with some iron and bronze grave goods, and a large piece of burned oak (Fontijn *et al*. 2013).

The 49 cremations from Oosterhout fit in this selective deposition practice, which can be observed in the relative large number of miniature urns. All the intact small urns encountered in the 49 cremations contained cremated remains. Some of the miniature urns were not intact and therefore the content of the miniature urn could not be determined. The amount of bone in the miniature urns varied from small fragments (0,01 gram) to 15 grams. The low amounts of bone inside the miniature urn could be the result of bioturbation, but the possibility exists the inclusion was intentional. Certainly the larger amounts of bone are more likely the result of an intentional activity. Unfortunately, the amount of bone was to small to determine whether the cremated remains were from another individual. Since most fragments were indeterminate, evidence of a preference in the use of fragments of a specific skeletal category could not be provided. Figure 5 shows a miniature urn *in situ*. The large urn had to be covered with plastic foil to prevent further damage. Figure 6 provides an example of added bone fragments to a miniature urn.

The inclusion of small urns is common during the Late Bronze Age and Early Iron Age in the western Flemish part of Belgium. The small ceramic vessels were added to an urn cremation and often contained cremated bone (De Mulder 1994: 105-106). This custom seems less known in the southern region of the Netherlands. Various studies on cremated remains from that area do not report the inclusion of miniature urns with cremated bone fragments (Cuijpers 2009b; Hoogland

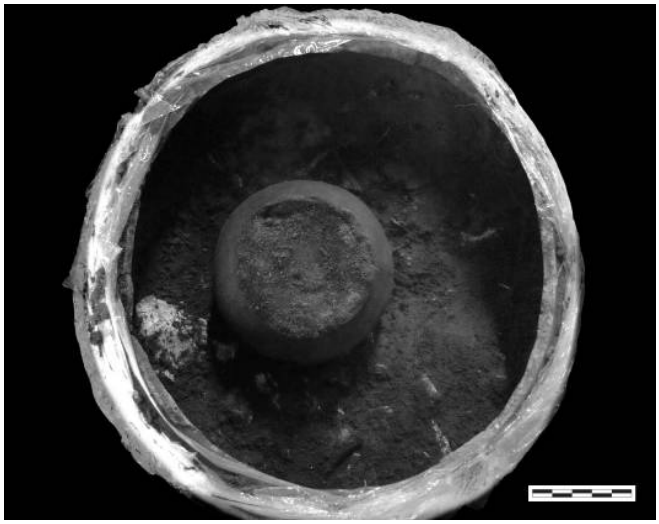

Fig. 5. Miniature urn in situ S914V117 (photograph Veselka 2013).

Fig. 6. Miniature urn S931V122 (photograph Veselka 2013).

1999: 74-77; Lemmers 2012a; Lemmers 2012b; Tol 1999; Veselka, Lemmers & Hoogland 2013). Smits (Roessingh *et al*. 2012) reported 2 cremations out of the 77 to contain small ceramic vessels included, a pot and a bowl. However, no bone fragments were encountered in these small ceramics. Cuijpers (2009c, 10) reported one urn cremation with a miniature urn containing bone fragments in her sample of 16 cremations. Further research on the frequency of miniature urns in cremated remains from Dutch sites from the Bronze Age and Iron Age is needed to confirm whether the number of miniature urns in Oosterhout is indeed remarkable in the Netherlands.

All of the cremations from Oosterhout containing a miniature urn (i.e. small ceramic vessels containing bone fragments) are located in the part of the site that was excavated in 2012. However, further research is needed to determine whether preference in spatial distribution existed.

Furthermore, microscopic analysis and radiocarbon dating of the cremated remains from the miniature urns could provide additional data which might aid in determining whether indeed the cremated remains from the miniature urns belong to another individual.

Although the 49 cremations analyzed for this paper are part of a larger amount, some aspects of this sample are different from the 77 cremations retrieved in 2010. The degree of fragmentation for the entire site is high due to taphonomic processes, such root activity and affected the number of cremations that were suitable for demographic analysis. However, the average weight of the 49 cremations is relatively higher than that of the 77 cremations. A local variation in taphonomic influences must have contributed to this difference, but the possibility of differences in handling the cremated remains and spatial preference cannot be ruled out. The amount of miniature urns is remarkable and is not frequently encountered in other Dutch collections from the Iron Age. Further research of the entire collection of Oosterhout is needed to determine whether the intra-sample differences are indicative of spatial preference regarding the inclusion of grave goods. In addition, future research of the various Dutch collections from the Metal Ages compared to surrounding regions, such as Belgium and Germany will provide insight in the regional and temporal performance of the *pars pro toto* ritual.

Acknowledgements

We owe many thanks to Antea Group B.V. and the municipality of Oosterhout who made it possible to study the 49 cremated remains.

References

ACSÁDI, G. & NEMESKÉRI, J. 1970. *History of human life span and mortality*. Budapest: Akadémiai Kiadó.

AUFDERHEIDE, A.C. & RODRÍGUEZ-MARTÍN, C. 1998. *The Cambridge Encyclopedia of Human Paleopathology*. Cambridge: Cambridge University Press.

BINK, M. & DYSELINK, T. 2009. *Oosterhout Vrachelen 4: inventariserend veldonderzoek door middel van proefsleuven*, BAAC-rapport A-08-0180.

CUIJPERS, A.G.F.M., 2009a. *The application of bone histology for species identification in archaeology; with a photo catalogue*, Geoarchaeological and Bioarchaeological Studies, 12. Amsterdam.

CUIJPERS, A.G.F.M., 2009a. *Fysisch antropologisch onderzoek op crematieresten uit Itteren, Roermond en Brunssum*, IGBA-Rapport 2009-02.

CUIJPERS, A.G.F.M., 2009a. *Fysisch antropologisch onderzoek van de crematieresten uit het grafveld Groesbeek-Spoorlaan*, IGBA-Rapport 2009-04.

DEMIRJIAN, A., GOLDSTEIN H. & TANNER, J.M. 1973, A New System of Dental Age Assessment, *Human Biology*, **45**, pp. 211-227.

DE MULDER, G., 1994. Aspects of the funeral ritual in the late Bronze Age and the Early Iron Age in the Western part of the Flemish region, *Helinium,* **XXXXIV**, pp. 94-133.

FONTIJN, D., JANSEN, R., VAN DER VAART, S., FOKKENS, H. & VAN WIJK, I. 2013. Conclusion: the seventh mount of seven mounds – long-term history of the Zevenberg barrow landscape. In: D. FONTIJN, S. VAN DER VAART & R. JANSEN (eds.), *Transformation through destruction: a monumental and extraordinary Early Iron Age Hallstatt C barrow from the ritual landscape of Oss-Zevenbergen*. Leiden: Sidestone Press, pp. 303-312.

GONÇALVES, D., DUARTE, C., COSTA, C., MURALHA, J., CAMPANACHO, V., COSTA , A.M. & ANGELUCCI, D.E. 2010. The Roman cremation burials of Encosta de Sant'Ana (Lisbon), *Arqueologia*, **13**, pp. 125-144.

GROSSKOPF, B. 2009. *Leichebrand. Biologisches und Kulturhistorisches Quellenmaterial zur Rekonstruktion vor- und frühgesichtlicher Population und ihrer Funeralpraktiken*. Leipzig (Dissertation Universität Leipzig 2004).

HERRMANN, B. 1988. Behandlung von Leichenbrand. *In*: R. KNUSSMANN (ed), *Antropologie. Handbuch der vergleichenden Biologie des Menschen* 4. Stuttgart: Fischer, pp. 576-585.

HERRMANN, B. 1990. *Prähistorische Antropologie: Leitfaden der Feld- und Labormethoden*. Berlin: Springer, pp. 256-275.

LEMMERS, S.A.M., 2011. *Burned Culture. An osteological research into Urnfield cremation technology and ritual in the South of the Netherlands based upon the Urnfield material of Maastricht-Ambyerveld*. Leiden (RMa Thesis).

LEMMERS, S.A.M. 2012a. Burned Culture: osteological research into Unrfield cremation technology and ritual in the South of the Netherlands. *Lunula. Archaeologica protohistorica*, **XX**, pp. 81-88.

LEMMERS, S.A.M. 2012b. *Crematiemateriaal uit Wijchen-Hoefsestraat: fysisch antropologisch rapportage*, internal publication Stichting LAB. Leiden: Leiden University.

MAAT, G.J.R. 1997. *A simple selection method of human cremations for sex and age analysis, Villafranca, Padovana*, Proceedings of the Symposium 'Cremation studies in Archaeology 1997.

MAYS, S. 2010. *The archaeology of human bones*. London: Routledge.

MCKINLEY, J.I. 1989. Cremations: expectations, methodologies and realities. *In*: C.A. ROBERTS, F. LEE & J. BINTLIFF (eds), *Burial archaeology, current research, methods and developments*, British Archaeological Reports, British series, 211. Oxford, pp. 65-76.

MCKINLEY,, J.I. 1993. Bone Fragment Size and Weights of Bone from Modern British Cremations and the Implications for the Interpretation of Archaeological Cremations, *International Journal of Osteoarchaeology*, **3**, pp. 283-287.

MILLAIRE, J.F. 2004. The Manipulation of Human Remains in Moche Society: Delayed Burials, Grave Reopening, and Secondary Offerings of Human Bones on the Peruvian North Coast, *Society for American Archaeology*, **15**, pp. 371-288.

MOORREES, C., FANNING, E. & HUNT, E. 1963. Age Variation of Formation Stage for Ten Permanent Teeth, *Journal of Dental Research*, **42**, pp. 1490-1502.

OSIPOV, B., HARVATI, K., NATHENA, D., SPANAKIS, K., KARANTANAS, A. & KRANIOTI, E.F. 2013. Sexual dimorphism of the bony labyrinth: a new age-independent method, *American Journal of Physical Anthropology*, **151**, pp. 290-301.

ROESSINGH, W., DRENTH, E., GEERTS, R., SMITS, E., LOHOF E. & KROMHOUT, B.J. 2012. H5. Een urnenveld uit de Late Bronstijd – Midden-IJzertijd. *In:* W. ROESSINGH & E. BLOM (eds.), *Graven op de Contreie – Bewoningsgeschiedenis van de Houtse Akker te Oosterhout, van Bronstijd tot en met de Slag om het Markkanaal*, ADC Monografie 14. Amersfoort: ADC, pp. 57-88.

ROYMANS, N. 1999. The Early Iron Age urnfield of Beegden. *In*: F. THEUWS & N. ROYMANS (eds.), *Land and Ancestors: cultural dynamics in the Urnfield period and the Middle Ages in the southern Netherlands*. Amsterdam: Amsterdam University Press, pp. 63-84.

SCHAEFER, M., BLACK, S. & SCHEUER, L. 2009. *Juvenile Osteology: a laboratory and field manual*. London : Academic Press.

SIGVALLUS, B. 2005. Viking Sweden. *In*: D.J. DAVIES, & L.H. MATES (eds), *Encyclopedia of cremation*. Aldershot: Ashgate, pp. 413-415.

STRATOULI, G., TRIANTAPHYLLOU, S., BEKIARIS, T. & KATSIKARIDIS, N. 2010. The manipulation of death: a burial area at the Neolithic Settlement of Avgi, NW Greece, *Documenta Praehistorica*, **XXXVII**, pp. 95-104.

TOL, A. 1999. Urnfield and settlement traces from the Iron Age at Mierlo-Hout. *In*: F. THEUWS & N. ROYMANS (eds.), *Land and Ancestors: cultural dynamics in the Urnfield period and the Middle Ages in the southern Netherlands*. Amsterdam: Amsterdam University Press, pp. 87-111.

TRAUTMANN, I. 2006. *The significance of cremations in Early Neolithic communities in Central Europe*. Tübingen: Univeristy of Tübingen.

UBELAKER, D.H. 1979. *Human Skeletal Remains: Excavation, Analysis and Interpretation.* Washington D.C.: Taraxacum (2nd ed.).

VESELKA, B., HOOGLAND, M.L.P. & LEMMERS, S.A.M. 2013. *Crematiemateriaal uit Veen, Fysisch antropologische rapportage*, internal publication Stichting LAB. Leiden: Leiden University.

WAHL, J. 1983. Zur metrischen Altersbestimmung von kindlichen und jugendlichen Leichenbränden, *Prähistorische Zeitschrift*, **34**, pp. 48-54.

WAHL, J. 1988. *Das römische Gräberfeld von Stettfeld I, Osteologische Untersuchung der Knochenreste aus dem Gräberfeld*. Stuttgart: Theiss.

WAHL, J. 2008. Investigations on Pre-Roman and Roman cremation remains form southwestern Germany: results, potentialities and limits. *In*: C.W. SCHMIDT & S.A. SYMES (eds), *The analysis of burned human remains*. London, pp. 145-161.

WAHL, J. & Graw, M. 2001. Metric sex differentiation of the pars petrosa ossis Temporalis, *International Journal of Legal Medicine*, **114**, p. 215.

WAHL, J. & Schwantes, G. 1988. *Süderbrarup: ein Gräberfeld der römischen Kaiserzeit und Völkerwanderungszeit in Angeln. 2. Antropologische Untersuchungen*. Neumünster: Wachholtz.

WALDRON, T. 2009. *Palaeopathology*. New York.

WHITE, T.D., BLACK, M. & FOLKENS, P.A. 2011. *Human Osteology*. Amsterdam: Elsevier Academic Press.

Workshop of European Anthropologists, 1980. Recommendations for age and sex diagnoses of skeletons, *Journal of Human Evolution,* **9**, pp. 517-549.