Gergő Paukovics

INTEGRATED METHODS OF COLLECTING AND PRESERVING THE ENVIRONMENTAL AND BIOARCHAEOLOGICAL HERITAGE IN HUNGARY: FAUNAL ASSEMBLAGE

MA Thesis in Cultural Heritage Studies: Academic Research, Policy, Management.

Central European University

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by

Gergő Paukovics

(Hungary)

Thesis submitted to the Department of Medieval Studies,

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of the Master of Arts degree in Cultural Heritage Studies: Academic Research, Policy, Management.

Accepted in conformance with the standards of the CEU.

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Thesis Supervisor

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External Reader

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External Supervisor

Budapest
Month YYYY

I, the undersigned, **Gergő Paukovics**, candidate for the MA degree in Cultural Heritage Studies: Academic Research, Policy, Management, declare herewith that the present thesis is exclusively my own work, based on my research and only such external information as properly credited in notes and bibliography. I declare that no unidentified and illegitimate use was made of the work of others, and no part of the thesis infringes on any person's or institution's copyright. I also declare that no part of the thesis has been submitted in this form to any other institution of higher education for an academic degree.

Budapest, 31 May 2016

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Abstract

In my thesis I offer a new bioarchaeological protocol with a special focus on animal remains for the medieval archaeological site of Pomáz-Nagykovácsi-puszta (Hungary, Pest County). Therefore I compared Hungarian zooarchaeological protocols and related documents through qualitative analysis in order to critically illuminate the following problems:

1. Lack of unified approach
2. Different focal points
3. Missing important issues

I analysed and compared the different concept and approaches towards bioarchaeology in North-America, Europe, and Hungary. This comparison resulted that there is no unified approach in the field neither in Europe, nor across the Atlantic. Unified terminology helps researchers of different field of study to understand, and to effectively communicate each other. For this purpose I deliberately employ the original, holistic concept towards bioarchaeology, which this way in my view could contribute more to the field of archaeology.

Through three selected case studies I shed light on methods used in practice from the planning period of an excavation until the implementation, and long-term archiving. Each of the case studies is designed to emphasise different set of issues in bioarchaeology such as excavation strategy, sampling, storage, and discarding policies.

My research on Hungarian and international protocols, and best excavation practices helped me to develop a new set of principles and a new bioarchaeological protocol for the planned excavation site of Pomáz-Nagykovácsi-puszta.

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I would like to thank József Laszlovszky for allowing me to research and excavate at Pomáz-Nagykovácsi-puszta, and Magdolna Vicze to let me take part in the Százhalombatta Archaeological Expedition.

I must thank the York Archaeological Trust for allowing me to research the materials from their excavations. I would like to thank Nienke van Doorn, Louis Carter, Ian Milsted, and Clare Rainsford, who were provided a lot of valuable supplementary information on various aspects of the excavations, and curation policies at York. Thanks must also go to Partick Gibbs, without him, my research in York would not have been possible.

Finally, I must express my very profound gratitude to my teachers, friends, family and especially Xénia Farkas, for providing me with unfailing support, motivation, and continuous encouragement throughout my years of study, research, and writing this thesis. This accomplishment would not have been possible without them. Thank you.

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1. Introduction

Unless we ask intelligent questions we are unlikely to get useful answers; and it is a waste of time to ask intelligent questions of data that have not been systematically collected with intelligent questions in mind.[1]

I remember my very first excavation like it was yesterday. As part of the undergraduate training at the university, students specialising in Roman archaeology had to do fieldwork on a Roman site in Hungary. I was very excited about my first "big" find which was a group of articulated dog bones including a complete lower jaw. I started to clean the soil from the bones carefully in order to make it nice for the photo documentation. When I asked the archaeologist who supervised the students what I should do with the dog remains, he advised me to dig it out quickly and carry on the excavation work. Without showing any interest in the animal bones he left me there standing over the bones. At that time I did not know how proper excavation training should be, or what an adequate excavation methodology encompassed. At that time I did not raised my voice against the practice of the deliberate neglect of zooarchaeology and scientific methods in general. Now I do.

Although a scientific approach to archaeology is not a new or original idea, there is a lack of a unified approach to sampling and collecting of bioarchaeological remains at Hungarian excavations. Excavating archaeologists should collect and preserve faunal and archaeobotanical remains as indicators of social and environmental history as well as cultural landscape information. They should do so in order to avoid permanent loss of the data once

[1] John Grahame Douglas Clark, "Bioarchaeology: Some Extracts on a Theme," *Current Anthropology* 14, no. 4 (1973): 467.

the excavation is complete. In Hungary, this is nevertheless rarely happens in field work and vital information is thus lost forever.

For all these reasons the main purpose of this thesis is to emphasise the importance of methods for collecting and preserving bioarchaeological and environmental archaeological data with a special focus on faunal remains. I chose this topic so that this thesis contributes to disseminating knowledge about bioarchaeology in Hungary, in contrast to the current situation where at best such information occupies appendices at the back of monographs. Such data therefore rarely form part of the general archaeological interpretation. For the balance, here should be stated that it is also partly because the general approach of specialists to work hard on produce data, but rarely interpret it in-depth.[2] Thus the fact should not overlooked that it is also the specialists responsibility to change these preconception. A further aim is to create guidelines for both the best (as a goal) and minimum practice in the collection and preservation bioarchaeological data for Hungarian archaeologists with a focus on the planned excavation of Pomáz-Nagykovácsi-puszta.

Bioarchaeological data provides answers to socio-cultural questions connected to many aspects of life in the past but not always the same questions as other kinds of material culture such as pottery or architecture. Each class of material culture is entangled with others – thus pottery may be made with plant temper and made from clay that comes from close by or was imported from special places. It is only bioarchaeology and other kinds of natural science data that can provide researchers with the answers. For this reason there is a need to propagate a more integrated (but still efficient and low-cost) approach to field work (collection), storage, analysis and publication. Environmental historical research, including bioarchaeology, geology, hydrology, and climatology has great potential for helping scholars from a number of fields understand the long-term ways in which human society impacts and

[2] Naomi Sykes, *Beastly Questions: Animal Answers to Archaeological Issues* (London: Bloomsbury, 2014), 1.

is impacted by environment in both the past and present. Sometimes these materials may be the only available evidence or information about biodiversity, environmental limitations, agricultural conditions, human diet, ritual, and ultimately, relations and interaction between humans and nature or humans among themselves.

The methodology in this thesis is specifically developed for Hungarian cultural heritage institutions and excavating archaeologists and the thesis also includes a proposed bioarchaeological protocol for implementation at the site of Pomáz-Nagykovácsi-puszta. The proposed protocol has special a focus on the faunal materials together with general reference to all the other bioarchaeological and environmental data that should be collected in parallel at the site and which are necessary for a proper evaluation of the material culture recovered from the excavations.

In addition, my research reviewed practice in three case studies to compare how similar institutions balance limited funding and time constraints on collecting and preserving bioarchaeological data, and samples. The importance of systematic sampling is demonstrated through a good initiative in the region, and these ideas will be applied to the work on-going at Pomáz-Nagykovácsi-puszta.

Collection and retention methods in bioarchaeology are also presented in this thesis through a case study on the work of the York Archaeological Trust (hereafter YAT) in York, UK. Although the British dataset is different from the Hungarian and best practices are not one-on-one adaptable, this case study represents highly relevant comparative examples of a systematic planning, implementation, and research. Centrally developed Hungarian protocols are important in setting the general principles to follow, but they have to ensure they have the flexibility to be adaptable to different size sites, to geographical, geological, and even financial conditions, because each of these variants carry with them their own body of problems.

The target audience of this thesis is particularly specialists in the field of bioarchaeology as well as field archaeologists and especially decision makers involved in the implementation of the field work. The contribution to knowledge here is creating guidelines that raise awareness about these issues in the Hungarian Association of Archaeologists, Hungarian academia, and elsewhere.

2. Methodology

The thesis focusing on the importance of bioarchaeology and examine how it is integrated in Hungarian archaeology. To examine this first I concentrate on three key questions in bioarchaeological research today, zooarchaeological research in particular:

1. The issue of terminology as the basis of communication between professional.
2. What kind of similarities and differences can be found in the recently accepted Hungarian protocols with regard to this class of data in particular?
3. How the Hungarian principles for protocols differ from the two selected international protocols.

To address the first question I give a historical overview on the development of bioarchaeology as a field of study through the analysis of the approach researchers took and utilised the term and the related terminology. This leads to the present days' situation where I demonstrate the contradictions of the contemporary approaches in Europe, North-America, and Hungary. I accomplished research on the approach university programs, courses, and research groups taking when they talk about bioarchaeology. I put it all in order to reveal ways of using the same term and attempt to find the best suiting one for the case of Hungary that is in my view stands just before the misinterpretation, and misuse of the terminology.

Protocols are the keystones of every archaeological process, and for this reason I addressed the second and third research question with the analysis of the coherency of the relevant archaeological protocols in Hungary. Hungarian zooarchaeological protocols were analysed through a comparative analysis. I demonstrate the similarities and differences of the protocols through a qualitative analysis of their content and coherency.

2.1. Case studies

In order to gain a broader view of the applied methods it is important to study methods used in practice. Thus I selected three case studies which are designed to shed light on similarities and differences in the following ways:

1. How do subjective decisions of the project leader (such as the choice of sampling method, collection strategies, and documentation) affect the resulted data of the excavations?

2. How do financial limitations in different institutions affect the selection of sampling methods and the end results of the excavations, including the choice of sampling methods, evaluation of data from the excavation?

3. How are various sampling methods applied, (if at all) such as screening (and mesh sizes), water sieving, taking soil samples, taking plant- or lipid-remain samples from pottery?

4. How do time limitations or shortage of workers or lack of equipment affect the selection of sampling methods and the end results of excavations, including the choice of sampling methods, evaluation of data from the excavation?

The three selected cases represent three different types of sites, and tree different set of issues and approaches:

1. Pomáz-Nagykovácsi-puszta: The medieval monastic site of Pomáz-Nagykovácsi-puszta is located in the Pilis Mountains, about 30 kilometres north of Budapest. The still on-going systematic excavations began in 2011. The site includes a workshop

surrounded by extensive outbuildings and several fish ponds as well. Managed woodland areas probably also belonged to the economic sphere of the monastery. The site has no excavation and storage protocol and one aim of the thesis to develop one for its bioarchaeological material with a special focus on faunal material;

2. The Százhalombatta Archaeological Expedition: The Százhalombatta Archaeological Expedition is an on-going international project where planned excavations have been carried out on a fortified Bronze Age tell settlement at Százhalombatta-Földvár since 1998. The site is used as an example of good practice due to its well developed methods of sampling, screening, wet sieving, and with the regular involvement of experts from various field of research such as archaeobotany, zooarchaeology, and soil-micromorphology;

3. The Hungate Project at York, UK: The Hungate Project was a large-scale urban development excavation, the biggest in the city of York, UK. The Hungate site is situated on the banks of the River Foss at the south-eastern edge of the city centre. Excavations were carried out by York Archaeological Trust from 2006 to 2011 and produced over 800 boxes of animal bones, covering over 2000 years of archaeological materials.

The Százhalombatta Archaeological Expedition project puts an emphasis on the constant dissemination and publication of its results and its methodologies as well. The policies for the Hungate Project are relatively new and in spite of the fact that the results were presented at different conferences, an in one academic paper, it is not widely known in academic circles. The new excavation campaigns at Pomáz-Nagykovácsi-puszta started in 2011 and the some preliminary results are already published, they mostly focusing on the architectural history and structure of the site. No methodological aspects are empathised in the papers.

For all these reasons every case study has a different focus. The Százhalombatta-Földvár case provides a general overview and analysis based on the existing publications, and my observations on the aims and methods of the excavations. The York case study gives a detailed overview of the policies and their application in practice at the YAT based on publications, grey literature, excavation reports, and the interviews and observations I made in April 2016. Finally, the Pomáz-Nagykovácsi-puszta case presents the current situation on the excavation methods, and proposes a new protocol for bioarchaeological finds with a special focus on the faunal remains.

The analysis of the first two cases' is based on my archaeological work experience on the sites. I worked on excavations at both archaeological sites' during the summer of 2015. I participated in the Pomáz-Nagykovácsi-puszta excavation from early June until the end of August, five days a week. I only interrupted the excavation at Pomáz in mid-July for two weeks to join the Százhalombatta-Földvár excavation where I spent ten days working on the site and took one extra day for conduct interviews, and photo-document the equipment and working methods.

My analysis of cases includes:

- A review on existing publications, excavation reports, and grey literature on the methodologies employed,
- My photo and written documentation of the equipment, tools, and working methods of the excavations,
- Structured interviews with the excavation leaders and staff based on the main questions described above.

3. What is *bioarchaeology* about exactly?

First of all it is necessary to clarify the terminology used in the thesis. There is a definite reason why this is absolutely essential. First and foremost, the topic of *bioarchaeology* itself is rarely discussed in the realms of Hungarian archaeology. Even if it is part of the academic discourse, the terms are often interchanged, or neglected, so it is crucial to explain how and in what sense I apply the term bioarchaeology. Although the term bioarchaeology is not widespread in Hungary yet, it is clear that a point will come when Hungarian archaeological terminology can no longer avoid it. Thus, the question is not whether to use, the given, and existing terminology or not, but rather how to use it? It is deeply embedded in Western archaeological literature and discourse, so it is impossible to bypass it. It is important at this point to introduce the term, before it is misunderstood, misinterpreted, or misused in Hungarian terminology, and leads to an "identity crisis" in this field.[3]

New tendencies in archaeological research show that more and more inter- and multidisciplinary research is done in archaeology. This can only be based on active cooperation and communication within and outside the connected disciplines. Communication by definition needs mutually understood signs and semiotic rules, in this case, terminology. To achieve successful communication between fields of archaeology it is crucial to have the same understanding of the terms used in order to speak the same language. Terminological identity is an essential basic for understanding what a discipline or field of study can provide, and what questions it can or cannot answer. Thus the question is "only" how, and by which means, to adapt the term for use in Hungarian archaeological terminology.

[3] László Bartosiewicz, *Régenvolt háziállatok: Bevezetés a régészeti állattanba* [Domestic animals in the past: Introduction to zooarchaeology], Bibliotheca Archaeologica, ed. Miklós Szabó and Gábor Kalla, (Budapest: L'Harmattan, 2006), 15.

3.1. The origins of bioarchaeology – historical overview

Before describing, and discussing the contemporary situation, and the situation in Hungary, it is important to give a historical overview of the terminological development. Geographical and epistemological differences have often led to confusions about the term in academic and popular literature.

Bioarchaeology as a term is now strongly embedded in anthropological, archaeological, and popular scientific literature.[4] Many authors describe the origins of the term as result of two independent development trends in the United Kingdom, and the United States during the 1970s.[5] As it is often cited, the term was used first by the British archaeologist Graham Clark in 1972, who employed the term to describe the prehistoric faunal remains from Star Carr, England.[6] The term was further developed in his work *Bioarchaeology: Some extracts on a theme* in 1973.[7] Clark notes: "bioarchaeology, the archaeology concerned first and foremost with life."[8] In this manner he addressed questions about interactions between humans and their natural environment, and *biome*.[9] Clark notes that it is not the task of archaeologists "to trace the course of climatic, geographical, botanical, or faunal history," but to fit archaeological data into its right place in an ecological context.[10]

[4] Jane E. Buikstra, "Preface," in *Bioarchaeology: The Contextual Analysis of Human Remains*, ed. Jane E. Buikstra and Lane A. Beck, (Burlington, MA: Academic Press, 2006), xvii.
[5] Ibid., xvii.; Kristina Killgrove, "Bioarchaeology," in: *Oxford Bibliographies Online – Anthropology*, ed. J.L. Jackson, Jr., (Oxford: Oxford University Press, 2013), 1.; Charlotte A. Roberts, "A View from Afar: Bioarchaeology in Britain," in *Bioarchaeology: The Contextual Analysis of Human Remains*, ed. Jane E. Buikstra and Lane A. Beck, (Burlington, MA: Academic Press, 2006), 417-419.
[6] John Grahame Douglas Clark, *Star Carr: A Case Study in Bioarchaeology*, (Reading, Mass.: Addison-Wesley Modular Publications, 1972)
[7] Clark, "Bioarchaeology," 464-470.
[8] Ibid., 464.
[9] Biome: a large naturally occurring formation of flora and fauna that have common characteristics and defined by climate conditions and biogeography (e.g., taiga or Mediterranean vegetation)
[10] Clarke, "Bioarchaeology," 467.

In this manner he takes a holistic approach towards the relation between bioarchaeological and archaeological data.

In the late 1970s, parallel to Clark's works, Jane Buikstra in the United States also started to use the term for describing her analysis on human skeletal remains. In spite of the fact, that from the 1970s, European and North-American academic (and non academic) literature developed parallel, based on their different principles, the influence of the American terminology on the European is highly conspicuous. The results of this process are described in details in the next subchapter.

In the early 1980s Peter T. Bobrowsky organised the terminological hierarchy of the related fields in order to find a way out after a similar "identity crisis" about the terminology in zooarchaeology. In his paper he also broke down the terminological units for bioarchaeology. Interestingly his categories are closer to the European approach than the American, although he is Canadian.[11] Figure 1 shows the tendency of the occurrence the words zooarchaeology, archaeozoology, and bioarchaeology in corpus of books from 1965 to 2009 in Google Books database. Although these results are statistically not significant, they demonstrate well the tendencies in terminology and the sharp increase from the mid-1990s. Here I have to note as well that I use consistently the term zooarchaeology instead of archaeolozoology, as with the contemporary trends of terminology, which can be also seen on Figure 1.

[11] Peter T. Bobrowsky, "Olsen and Olsen's Identity Crisis in Faunal Studies," *American Antiquity* 47, no. 1 (1982): 181, Figure 1.

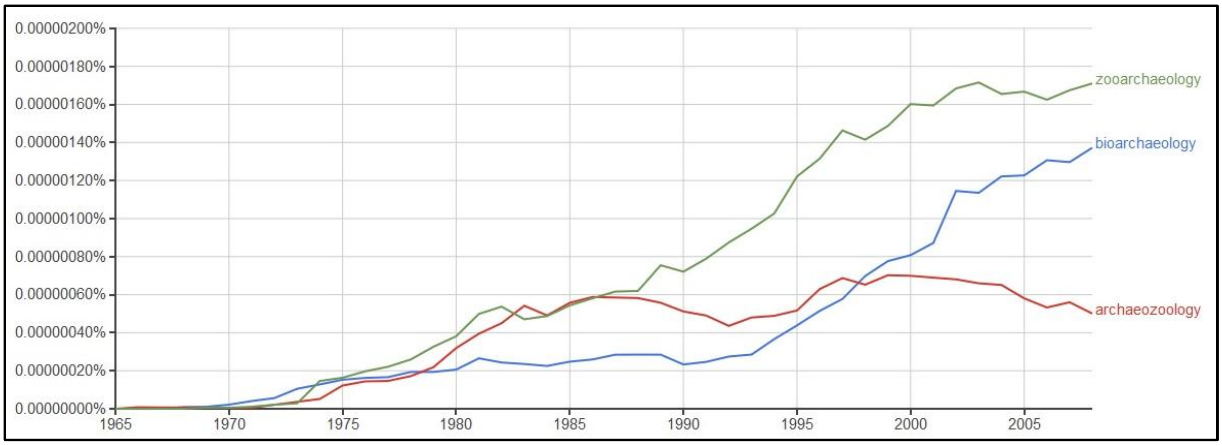

Fig. 1: The occurrence of words zooarchaeology, archaeozoology, and bioarchaeology in corpus of books in Google Books database (made with Google Books Ngram Viewer)

Recently, Kristina Killgrove, assistant professor in the Department of Anthropology at the University of West Florida, compiled an extensive annotated bibliography of the English literature on the subject in the *Oxford Bibliographies Online*.[12] Her compilations of works is an important piece of the academic literature on bioarchaeology, however she completely miss out for example European (other than English), or South-American literature from the bibliography, whereas Charlotte Roberts argues that for example the term *bioarchaeology* was referred by Vilhelm Møller-Christensen in Denmark earlier, in the 1950s.[13] Although Clark notes[14] that in 1920 Albert Egges van Giffen established the *Biologisch-Archeologisch Instituut* [Biological-Archaeological Institute – now Groningen Institute for Archaeology] at the *Rijksuniversiteit Groningen* [University of Groningen],[15]it is also often left out from the historical overviews.

[12] Kristina Killgrove, “Bioarchaeology,” in: *Oxford Bibliographies Online – Anthropology*, ed. J.L. Jackson, Jr., (Oxford: Oxford University Press, 2013): 1-34.
[13] Roberts, “A View from Afar,” 418.
[14] Clark, “Bioarchaeology,” 465.
[15] J. Ayolt Brongers, “Giffen, Albert Egges van (1884-1973),” in *Biografisch Woordenboek van Nederland* vol. 3 [Biographical Dictionary of the Netherlands vol. 3], ed. I. Schöffer, (Den Haag: Huygens Instituut voor Nederlandse Geschiedenis, 1989), accessed May 22, 2016, http://resources.huygens.knaw.nl/bwn1880-2000/lemmata/bwn3/giffen

3.2. The contemporary situation

The contemporary situation can be even more confusing when looking for definitions of the term in European, and American academic literature. It can be easily demonstrated through two quotations;

The first one from a British bioarchaeologist:

"The term "bioarchaeologist" used in Britain where it describes somebody who studies *any* biological materials (as opposed to North America where it relates *only* to human remains). In Britain, bioarchaeology could include the study of macroscopic/microscopic plant remains, animal bones, molluscs, or human remains."[16]

The second one from an American bioarchaeologist:

"Most recent definitions of bioarchaeology do not include animal bone as part of the purview of research in the field."[17]

It is clear from these quotations that the British (along with some European) specialists take a much more holistic approach compared to the American, where most of the specialists look at bioarchaeology as privileged for the analysis of human remains.

To have a better understanding I completed an internet-based search, looking for university programs and courses that provide any kind of degree in bioarchaeology or in a related field. The aim of this research was to discover what it means to have a BSc or an MSc degree in bioarchaeology? I looked through university and educational websites, course

[16] Roberts, "A View from Afar," 418.
[17] Killgrove, "Bioarchaeology," Zooarchaeology.

structures, calls for applications, mission statements, and program curricula. The research focused on the following countries: United Kingdom, The Netherlands, Sweden, Norway, Denmark, Hungary, and the USA. The sample is only representative for Europe, and not globally. To refine my understanding of university programs and connected projects I categorised them according to their focus, core studies, and approach to bioarchaeology. The three different groups which can be differentiated are shown in Figure 2.

Groups	**University/Country**	**Degree (BSc/MSc)/Course/Research Group**
Group 1: A focusing exclusively on human skeletal analysis	University College London/UK	MSc
	John Moores University/UK	MSc
	University of Lund/Sweden	Course
Group 2: Human skeletal analysis is the focus with complementary courses in zooarchaeology	Bournemouth University/UK	MSc
	Bournemouth University/UK	MSc
	Arizona State University/US	Research group
Group 3: The focus is divided on all/(or at least two) elements of bioarchaeology: animal, human, and botanical remains	University of Oxford/UK	Research group
	University of York/UK	BSc
	University of York/UK	MSc
	University of Exeter/UK	MSc
	Leiden University/NL	MSc
	University of Groeningen/NL	Research group
	University of Miskolc/HUN	Course
Total:	**Universities: 12** **Countries: 5**	**Course: 2** **BSc: 1** **MSc: 7** **Research group: 3**

Fig. 2: Groups of university courses, programs and research groups in bioarchaeology[18]

[18] The textual analysis of the university programs and courses are beyond the scope of this thesis. The search not resulted any finds from Norway, and Denmark. For the original texts see: UCL Institute of Archaeology, "MSc in Bioarchaeology and Forensic Anthropology," accessed March 23, 2016, http://www.ucl.ac.uk/archaeology/studying/masters/degrees/msc_bioarchaeology/index; Liverpool John Moores University, "Bioarchaeology MSc," accessed March 23, 2016, https://www.ljmu.ac.uk/study/courses/postgraduates/bioarchaeology; Lunds Universitet, "Historisk osteologi: Humanosteologi och bioarkeologi" [Historic osteology: Human osteology and Bioarchaeology], accessed March

3.3. The Hungarian situation

A simple Google internet search returned 262 000 items (01.03.2016) for the word "bioarchaeology". The Hungarian term which is occasionally used for bioarchaeology is "*biorégészet*" [bioarchaeology] or "*bio-régészet*" [bio-archaeology], but Google returned only 22 items on the same day for these words. Looking through the results, the sites which used the term are; one academic paper,[19] one abstract,[20] and one project description of the Hungarian Academy of Sciences' work on archaeogenetics.[21] All the other returns came from information websites about history[22] or news sites.[23] The reason for this lay behind the

23, 2016, http://www.lu.se/lubas/i-uoh-lu-HOSA22; Bournemouth University, "Bioarchaeology MSc," accessed March 23, 2016, https://www1.bournemouth.ac.uk/study/courses/msc-bioarchaeology; Bournemouth University, "Biological Anthropology MSc," accessed March 23, 2016, https://www1.bournemouth.ac.uk/study/courses/msc-biological-anthropology; School of Human Evolution and Social Change, Arizona State University, "Bioarchaeology," accessed March 23, 2016, https://shesc.asu.edu/graduate/bioarchaeology; University of York, "BSc Bioarchaeology," accessed March 23, 2016, http://www.york.ac.uk/archaeology/undergraduates/courses/bsc-bioarchaeology/#course-overview; University of York, "MSc in Bioarchaeology," accessed March 23, 2016, http://www.york.ac.uk/archaeology/postgraduate-study/taught-postgrads/masters-courses/msc-biological-archaeology/#tab-1; School of Archaeology, University of Oxford, "Bioarchaeology," accessed March 23, 2016, http://www.arch.ox.ac.uk/bioarchaeology.html; University of Exeter, "MSc Bioarchaeology," accessed March 23, 2016, http://www.exeter.ac.uk/postgraduate/taught/archaeology/bioarch/; Universiteit Leiden, "Bioarchaeology (research)," accessed March 23, 2016, http://en.mastersinleiden.nl/programmes/bioarchaeology-research/en/introduction; Rijksuniversiteit Groningen, "Research Group. Bioarchaeology," accessed March 23, 2016, http://www.rug.nl/research/groningen-institute-of-archaeology/research/research-groups/environmental-archaeology-gia; Történettudományi Intézet, Miskolci Egyetem, Bölcsészettudományi Kar [Institute for History, University of Miskolc, Faculty of Philosophy], "Történelem-Régészet szakirány mintaterve" [Program Schedule of History with a specialisation in Archaeology], "Bioarcheológia" [Bioarchaeology], accessed May 06, 2016, http://tortenelemszak.uni-miskolc.hu/oraleirasok/BTTON202PRE.pdf

[19] Alexandra Anders, Pál Raczky, "Háztartások és Települési Egység Viszonya Polgár-Csőszhalom Késő Neolitikus Lelőhelyén," [Relation Between Households and Settlement Unit at the Late Neolitic Site of Polgár-Csőszhalom], *Ősrégészeti Levelek/Prehistoric Newsletter* 13 (2013): 78-101.

[20] Orsolya Láng, Alice Mathea Choyke, „Lelet-e a Csont? A Bio-régészet Mintaszerű Beépítése a Régészeti Munkába az Aquincumi Múzeumban," [Is bone a find? Best Practice for Incorporating Bio-archaeology into the Archaeological Work at the Aquincum Museum], in Környezet, Ember, Kultúra. "Az Alkalmazott Természettudományok és a Régészet Párbeszéde." Absztrakt Kötet, [Environment, Man, Culture. "The Dialogue Between Applied Natural Sciences and Archaeology." Abstract Volume], (Budapest: Magyar Nemzeti Múzeum, Nemzeti Örökségvédelmi Központ), 2010, accessed March 23, 2016, http://documents.tips/documents/absztraktkotetkek2010.html

[21] "Lezárt Kutatási Témák - A Kárpát-medence Népességének Archeogenetikai Vizsgálata az Újkőkorban," [Past Research Projects - The Population History of the Carpathian Basin in the Neolithic Period and its Influence on the Colonization of Central Europe], Laboratory of Archaeogenetics in the Institute of Archaeology RCH HAS, accessed March 23, 2016, http://www.ri.btk.mta.hu/archaeogenetika/lezart_projekt.html

[22] Viasat History, "A Medici Akták," [The Medici Files], accessed March 23, 2016, http://viasat-history.hu/program/5757/; "A 10 Ezer Éves Forradalom," [The 10 Thousand Years Old Revolution], *Múlt-kor Történelmi Portál*, March 29, 2012, accessed March 23, 2016, http://mult-kor.hu/20120329_a_10_ezer_eves_forradalom; "Hajmintákból Rekonstruálják a Perui Múmiák Utolsó

original English sources these sites used to gather information. A search on MATARKA (Searchable Database for Table of Contents of Hungarian Journals) returned no finds for "biorégészet", or "bio-régészet", which means that not a single published academic paper in the MATARKA system uses these terms. The Hungarian-English Dictionary of Archaeological Terms does not have an entry for bioarchaeology.[24] It is clear from these data that aside from the few exiguous examples, the term is not used in any form in academic and media circles in Hungary.

"*Bioarchaeológia*" [bioarchaeology] is also used occasionally. Google returned 5 240 items, mostly used by the same authors or online journals. The higher number of finds for the word is deceptive since the same spelling also used by Italian websites without accent on the second "o" of the word (*bioarcheologia*, *bio-archeologia*). In addition László Bartosiewicz also uses the term "bioarchaeológia" when translating Bobrowsky's figure on the terminological hierarchy for faunal studies into Hungarian.[25] Furthermore the University of Miskolc has a course "Bioarcheológia" as part of a block in environmental archaeology. This is the only course in Hungary by this name.[26] The course incorporates lectures about historical

Hónapjait," [Reconstruction of the Last Months of the Peruvian Mummies from Hair-samples], *Múlt-kor Történelmi Portál*, published on-line: February 20, 2015, accessed March 23, 2016,http://mult-kor.hu/hajmintakbol-rekonstrualjak-a-perui-mumiak-utolso-honapjait-20150220

[23]" A kutyák szerepe az emberré válásban," [The Role of Dogs in Becoming Human], *Origo*, May 7, 2002, http://www.origo.hu/tudomany/elet/20020507akutyak1.html; "Kegyetlenül Meggyalázták III. Richárd Holttestét," [The Body of Richard III Was Cruelly Disgraced], *Origo*, February 4, 2013, accessed March 23, 2016, http://www.origo.hu/tudomany/tortenelem/20130204-iii-richard-maradvanyai-egy-leicester-kornyeki-sirban-talalhatok.html; Dorian Furtună, "Szex és Hatalom: A Szexuális Despotizmus Evolúciós Előnyei," [Sex and Power: The Evolutionary Advantages of Sexual Despotism], *EuroCom – A Romániai Sajtófigyelő*, October 23, 2015, accessed March 23, 2016, https://eurocom.wordpress.com/2015/10/23/szex-es-hatalom-a-szexualis-despotizmus-evolucios-elonyei-adevarul-blog/

[24] Magdolna Tulok and János Makkay, "Angol-Magyar és Magyar-Angol Régészeti Kifejezések Szótára," [English-Hungarian and Hungarian-English Dictionary of Archaeological Terms], (Budapest: Encikopédia Kiadó, 2004)

[25] Bartosiewicz, *Régenvolt háziállatok*, 2. Table, 15.

[26] Régészettudományi Intézet, Eötvös Loránd Tudományegyetem Böcsészettudományi Kar [Institute of Archaeological Sciences, Eötvös Loránd University, Faculty of Humanities], "Kurzusok MA" [MA Courses], accessed May 03, 2016, http://regeszet.elte.hu/ma; Régészettudományi Intézet, Eötvös Loránd Tudományegyetem Böcsészettudományi Kar [Institute of Archaeological Sciences, Eötvös Loránd University, Faculty of Humanities], "Kurzusok BA" [BA Courses], accessed May 03, 2016, http://regeszet.elte.hu/ma

anthropology, osteology, zooarchaeology, and archaeobotany. From this structure it is clear that the approach is closest to the approach of this thesis.[27]

News about new scientific discoveries and popular science articles are often taken, and translated word-by-word from American or British new agencies, and news portals in Hungary. It is no wonder that the English terms which have no established Hungarian versions are often transformed into words which sound a bit more Hungarian, such as "*bioarchaeológia*", or "*bioarchaeológus*" [bioarchaeologist].[28]

3.4. Why *bioarchaeology* is a useful term and how I use the term

Unified terminology helps researchers from different fields to communicate and to develop the same kind of mindset about the possible research field can provide answer to particular sort of questions or can contribute to a field of science. "Standardised terminologies should be employed to ensure that reported data are clear and unambiguous, and therefore allow comparability with other datasets."[29] How much bioarchaeology can contribute to the field of archaeology if it is only limited to the contextualised analysis of human remains? For that archaeology has physical/archaeological/historical anthropology, human osteology, and so on. As a matter of course, I am alone not in taking a position to see the needs for the establishment of a new term in Hungarian archaeology, but I hope to contribute with my arguments in this thesis.

[27] Történettudományi Intézet, Miskolci Egyetem, "Bioarcheológia"
[28] Eötvös Loránd Tudományegyetem Böcsészettudományi Kar [Eötvös Loránd University, Faculty of Humanities], "Régészet 2015-től felvetteknek" [Archaeology for enrolled from 2015], accessed May 23, 2016, http://www.btk.elte.hu/file/BA_r_g_szet_2015.pdf
[29] Polydora Baker and Fay Worley, *Animal Bones and Archaeology. Guidelines for Best Practice*. (Swindon: English Heritage, 2014), 26.

As again Clark notes, the main object of espousing bioarchaeology "was and is to give a more fruitful direction to research." [30] Is it more useful then to give physical/archaeological/historical anthropology/osteology another name or is it more useful to use it as an umbrella term that is useful for describing any biological archaeological material? In my opinion the latter option is "more fruitful" thus I use bioarchaeology as an umbrella term to describe any biological material that derives from archaeological contexts. Obviously I am not in a position to decide on the Hungarian terminology alone, but I do suggest establishing the term *bioarchaeológia* for bioarchaeology.

[30] Clark, "Bioarchaeology," 465.

4. Comparison of Hungarian archaeozoological protocols

Protocols are important for specialists, but more important for non-specialists, field archaeologists, technicians, keepers of records, museum/storage managers/curators, assistant crew, and anybody who have contact the material in any stage of collection, recording, storage. In Hungary, specialists in zooarchaeology usually do not taking part in all stages of the excavation. There are two main reasons behind this practice: 1. The small number of specialists who are usually overburden with the amount of already excavated materials, 2. The general ignorance of bioarchaeological data.

Therefore it is essential to have principles and guidelines to follow for non-specialists (and specialists too!) of any field of study in order to secure the data when specialist cannot supervise the processes. It is not enough to have a protocol, it is the site director's/manager's, find manager's, storage manager's, etc. responsibility to make the working staff understand why to follow, and supervise the implementation of it. In an ideal situation the excavation leader/site manager should have a solid understanding of the importance of bioarchaeology and related fields, and the implementation of the protocol, but it is rarely happens in practice.

4.1. Methodology

This chapter is a comparison of the existing zooarchaeological protocols and related documents in Hungary through qualitative analysis in order to critically illuminate the following problems:

4. Lack of unified approach

5. Different focal points

6. Missing important issues

7. Different genres

The protocol of the International Council for Archaeozoology (hereafter ICAZ) was used as a frame of reference in the analysis of relevant existing Hungarian archaeological protocols. The documents were analysed from two different standpoints: first the content of the protocols, and second what they mandate about the required content of a zooarchaeological report.

4.2. Overview of Hungarian protocols for zooarchaeology

After long term consultation between various experts of zooarchaeology in Hungary the first general protocol, the *Archaeozoological Protocol and Records of Finds* was completed in 2009. The document was ordered by the Hungarian National Museum's National Monument Protection Centre (Magyar Nemzeti Múzeum, Nemzeti Örökségvédelmi Központ, hereafter NÖK) with the intention of creating generally accepted protocols for each special field of archaeology. By the 1st of January 2015 the NÖK had been dissolved and its authority and responsibilities were taken over by The Gyula Forster National Centre for Cultural Heritage Management (Forster Gyula Nemzeti Örökségvédelmi és Vagyongazdálkodási Központ) a new, centralised governmental institution.[31] The NÖK

[31] Magyar Országgyűlés [Hungarian Parliament], *A Kormány 1513/2014. (IX. 16.) határozata a Magyar Nemzeti Múzeum Nemzeti Örökségvédelmi Központja által ellátott egyes feladatoknak a Forster Gyula Nemzeti Örökségvédelmi és Vagyongazdálkodási Központ részére történő átadásáról* [Act No. 1513 of 2014 IX. 16. On the Transfer of Certain Task From the Hungarian National Museum's National Heritage Centre to the Gyula Forster National Heritage and Asset Management Centre].

protocol was adopted by the Hungarian National Museum which was also given authority over county museums at the time of its creation.

The *Guidelines for Microfaunal and Archaeobotanical Sampling* was written also in 2009 by Zsófia Kovács and Brigitta Berzsényi at the Aquincum Museum which is a branch museum under the authority of the Budapest History Museum (Budapesti Történeti Múzeum). The *Protocol of Archaeozoological Laboratory* for the Aquincum Museum was completed in the next year by Alice Choyke.

In 2011 the *Handbook of Archaeology* (hereafter Handbook) was published by the Association of Hungarian Archaeologists (Magyar Régész Szövetség). The goal at that time was to create a practical handbook of archaeology in order to replace the old *Handbook of Archaeology vol. 1.* (1954) which had become obsolete in many aspects.[32] The new handbook provides an overview on every possibly field of archaeology from recovery and documentation to laboratory work and processing. In the Handbook the subchapter Archaeozoology written by Erzsébet Berendi falls under the fourth chapter: Natural Scientific Investigations. The subchapter is heavily influenced by the ICAZ protocol, but it is rather a handbook for students, and archaeologists to provide new ideas and to have a better understanding within the bigger archaeological picture.[33]

4.3. Selection criteria

The first and foremost problem of research on existing protocols is their accessibility. They are only in a few cases available online. Most of the museums handle them as internal

[32] Müller Róbert et al., *Régészeti Kézikön*y [Handbook of Archaeology] (Budapest: Magyar Régész Szövetség, 2011), 5.
[33] Ibid., 6.

private documents and as such they are not available to the public. Thus the basis of selection criteria was to provide an accurate overview of the existing protocols mainly focusing on those institutions that have online accessibility to their protocols. Fortunately, the protocols of the Hungarian National Museum, and the Handbook were available online, providing a good basis for the analysis. The only exception was the Budapest History Museum's two protocols which were provided by Alice Choyke who directed work in the zooarchaeology laboratory at the Aquincum Museum during the period the protocols were written (2009-2010) and also contributed to the development of the documents. For the analysis I handled the museums *Protocol of Archaeozoological laboratory* and the *Guidelines to Microfaunal and Archaeobotanical Sampling* together, because I strongly believe that they are belong together in many ways.

The altogether five documents cover two of the most important archaeological institutions and museums and the handbook of the most important independent association in Hungarian archaeology. Thus the comparative analysis provides significant results about the general approaches to zooarchaeology in Hungary.

The analysed documents are the following:

1. Hungarian National Museum: Archaeozoological Protocol and Records of Finds,[34]
2. Budapest History Museum: 1. Protocol of Archaeozoological laboratory.[35] 2. Guidelines to Microfaunal and Archaeobotanical Sampling,[36]
3. Handbook: Erzsébet Berendi, Archaeozoology,[37]

[34] *Archaeozoológiai Protokoll és a Leletek Nyilvántartása* [Archaeozoological Protocol and Records of Finds] (Budapest: Nemzeti Örökségvédelmi Központ, 2009)
[35] Alice Choyke, *Archaeozoológiai labor-protokoll* [Archaeozoological laboratory protocol] (Budapest: Budapest Történeti Múzeum, 2010)
[36] Kovács Zsófia and Berzsényi Brigitta, *Útmutató a Mikrofaunisztikai és Archaeobotanikai mintavételezéshez*. [Guidelines to Microfaunal and Archaeobotanical Sampling] (Budapest: Budapesti Történeti Múzeum, 2009)
[37] Berendi Erzsébet, "Archeozoológia [Archaeozoology]," in: Müller Róbert et al., *Régészeti kézikönyv* [Handbook of Archaeology], (Budapest: Magyar Régész Szövetség, 2011), 442-450.

4. Archaeological Norms, vol. 1. General Requirements for Archaeological Documentation; Guideline for the Members of the Hungarian Association of Archaeologists.[38]

4.4. The ICAZ protocol

ICAZ published its protocol in 2009 after four year of preparation by the International Council for Archaeozoology Task Force on Professional Protocols. The document itself is not a general protocol in the sense of giving specific description on what should be done during fieldwork, in the laboratory, or in storage facilities. It is rather a guideline or “general statements of standards and best practices”[39] for creating protocols and provides professionals with a basis to negotiate with institutions and “managers of repositories, administrators, and others under whose care archaeozoological remains and associated documentation fall.”[40]

The protocol covers five general themes:

1. Professional Responsibilities
2. Publication of Archaeozoological Data
3. Collections Care
4. Archiving Archaeozoological Data
5. Access to Collections and Data

[38] *Régészeti Normatíva, vol. 1. A Régészeti Dokumentációk Készítésének Általános Követelményei: Útmutató a Magyar Régész Szövetség Tagjai Számára* [Archaeological Norms, vol. 1. General Requirements for Archaeological Documentation; Guideline for the Members of the Hungarian Association of Archaeologists] (Budapest: Magyar Régész Szövetség 2007)
[39] Elizabeth J. Reitz et al., “International Council For Archaeozoology (ICAZ) Professional Protocols For Archaeozoology,” Published online, 2009), Preamble, accessed December 7, 2015, http://alexandriaarchive.org/icaz/pdf/protocols2009.pdf
[40] Ibid., Preamble

In order to compare the available Hungarian protocols I took the ICAZ protocol as the basis of the analysis and went through the themes listed above to see whether they are discussed and/or emphasised or not.

4.5. The analysis

4.5.1. The protocols

4.5.1.1. Professional responsibilities

As a member of an interdisciplinary research team zooarchaeologists have professional responsibilities in an institution or in an archaeological project. In an ideal situation many different type of researchers and experts from various field are involved from the planning process of an excavation. In this manner the communication between the team members from the beginning is the key to successful research. As stated in the ICAZ protocol the leader of the excavation and field archaeologist should discuss the research questions and goals of the excavation with their zooarchaeologists, especially when there are specific objectives for the zooarchaeological study.[41] This communication is also a key element and provides a basis for further research possibilities. One result of my analysis is that in the researched Hungarian examples the emphasis on communication with field archaeologists displays a range of varieties. The stress varies on a scale from The National Museum's protocol which only mention the issue, to the Handbook which puts the highest emphasis on the question.

The ICAZ protocol does not deal with "on site documentation" and it can be assumed that the reason behind this is that this form is not usually the responsibility of

[41] Ibid., Professional Responsibilities; Kovács and Berzsényi, *Útmutató a Mikrofaunisztikai és Archaeobotanikai mintavételezéshez*, 1.

thezooarchaeologists and created mostly by excavating archaeologists and technicians. This approach is also common in the Hungarian examples, although the Handbook emphasises the importance of “on site documentation” within the Archaeozoology subchapter as well. The explanation according to the Handbook is that documentation made by the field archaeologist is often incomplete because of the lack of time on the site[42]although the real reason is sadly the undervaluation of animal bone material and incompetency. To incorporate adequate excavation methods and proper documentation must be the responsibility of the excavation leader and the site manager.

Cooperation with specialists is just as important as communication with field archaeologists. To succeed in creating a complete and accurate piece of research, zooarchaeologists often need to consult with other specialists (e.g. bird, fish, mollusc, small mammal, archaeobotanical and pollenspecialists). This cooperation needs to be emphasised or at least indicated by an institutional protocol. This cooperation can frequently poisoned by intellectual jealousy or other vehicles of power policy between researchers or even institutions. This can be even more harmful if it leads to mistakes and misinterpretations. The exception is in the Aquincum Museum’s protocols where cooperation with other specialists was not mentioned in the selected documents.

[42] Berendi, “Archaeozoológia,” 442-443.

	ICAZ	National Museum	Aquincum Museum	Handbook
Communication with field archaeologists	Heavily emphasized	Only mentioned	Emphasized	Heavily emphasized
On site documentation	-	Mentioned, but not defined	-	Emphasized
Cooperation with specialists	Yes	Yes	-	Yes

Fig. 3: Professional responsibilities in zooarchaeological protocols

4.5.1.2. Collections Care

As it is emphasised in the ICAZ protocol, collections care starts already with the planning of the excavation and continues with the methods of recovery of archaeological objects.[43] In some way, it is hard to distinguish some elements of the process of archiving and collections care. I separated here the recovery and processing phase from the repository and inventory phase. These stages often overlap but the analysis followed the ICAZ protocol's general topics. Highlighted in the documents is the vexed question of discarding of material. The ICAZ protocol is very clear in this point, saying no to selective or full discard of a bone material, even for unidentifiable items. In this regard, the Hungarian protocols follow the same scheme, namely, only the discard of unidentifiable items after documentation is allowed. It must be emphasised, that "animal bone assemblages are an irreplaceable resource, therefore the ideal approach to their archiving is properly funded retention."[44] Unfortunately, in practice, not only the unidentifiable items are discarded, but often the whole material together with them. This method is in contrast to the theoretical approach and comes from the practice of collection care, where issues such as finance, storage space, assured environment for storage, and storage conditions are often considered more important in general, or for other

[43] Reitz et al., "ICAZ Professional Protocols," Collections Care
[44] Baker and Worley, *Animal Bones and Archaeology*,24.

kinds of material like ceramics, glass, metal, etc.[45] Nevertheless, if a discarding policy is needed it must aim to minimise loss of information and follow more specific guidelines, which should be defined in the site/institutional protocol.[46]For more on this issue see Case Study No.3 about the applied retention/discarding policies.

	ICAZ	National Museum	Aquincum Museum	Handbook
Cleaning	-	staff, except skulls	by expert	staff, except skulls or bones in bad condition
Bag	-	paper bag/box, plastic bag	plastic bag	paper bag/box, plastic bag
Bones from closed context	-	-	special care	special care
From mixed Stratigraphic Unit	-	-	discarding	discarding
Identification and measurements	-	von den Driesch, Schiebler	von den Driesch, Schiebler	-
Weight	-	yes	yes	-
Cutmarks	-	yes	yes	-
Destructive examination	must be documented	-	-	mentioned, but not defined
Pathologic and exotic cases	-	-	special care	-
Worked bones	-	restoration	special ID number	together with the context
Restoration	-	worked bones	only exhibited items	-
Discard unidentifiable items	no	yes, after documentation	not defined	yes, after documentation
Database	online/digital with backup	CSONTÁSZ	CSONTÁSZ	-

Fig. 4: Professional tasks and collections care in zooarchaeological protocols

[45] Rachel Edwards, *Archaeological Archives and Museums 2012*. ([ ]: Society of Museum Archaeologists. 2013), 43-44.
[46] Baker and Worley, *Animal Bones and Archaeology*, 24.

4.5.1.3. Archiving Archaeozoological Data

Archiving of archaeological data is equally important in museum care practice as the methods of excavation and collection. It has to go hand in hand with site management and collection care. "The requirements of the repository should need to be identified at an early stage of the project planning."[47] Develop proper protocol (and its implementation) for archiving any kind of archaeological data is a key element to any processing, analysis, and further research. It is also indispensable to build a transparent system in archiving.

Thus, the general Hungarian protocols generally lack unified approaches in:

1. Handling and recording of microfaunal, mollusc, and fish remains
2. General storage conditions
3. Repository, documentation, and inventory numbers
4. Discarding

Nonetheless, no one should assume that the experts of zooarchaeology in these leading Hungarian institutions are not interested in handling these issues in a proper way although these issues should be clarified and codified in the protocols as well. One cannot emphasise enough the role of protocols in this manner. They are not only developed for the professionals in a specific field but aimed at all employee of a given institution.

[47] Baker and Worley, *Animal Bones and Archaeology*, 24.

	ICAZ	National Museum	Aquincum Museum	Handbook
Molluscs	-	separate bags	mentioned (P2*)	-
Microfaunal remains	-	-	heavily emphasized (P2)	emphasized
Fish bones	-	-	-	emphasized
Storage conditions	mentioned, but not defined	mentioned, but not defined	-	only before processing
Repository & documentation	emphasized	-	-	-
Inventory numbers	-	defined	bags & boxes, worked bones	worked bones
Discarding	no	yes, defined	documentation with nr. & context	-

Fig. 5: Archiving zooarchaeological data (*P2 stands for Kovács and Berzsényi, *Útmutató a Mikrofaunisztikai és Archaeobotanikai mintavételezéshez,* to separate it from Choyke, *Archaeozoológiai labor-protokoll*)

4.5.1.4. Access to Collections and Data

This topic is generally left out of every single protocol and documents in the Hungarian examples. Although transparency and accessibility should play an important role in scientific research there is a lack of an unified approach or at least it remains hidden in the accessible documents.

4.5.2. The zooarchaeological report

Figure 6 shows the results of the comparison of the mandates concerning the content of zooarchaeological reports as defined in the examined Hungarian protocols. The ICAZ protocol does not provide specific recommendations about the content of a zooarchaeological report although it is necessary to place it into the analysis. The reason for this is its emphasis on giving the sample size in the report which is crucial in any kind of scientific analysis. In this respect the only Hungarian example that provides such a mandate is the Aquincum

Museum's *Guidelines to Microfaunal and Archaeobotanical Sampling*, which was one of the reasons I handled it together with the museum's *Archaeozoological laboratory protocol*.As can be read from Figure 6, there are few things the protocols agree on, these are the faunal list, traces of meat processing, and the importance of worked bones. In all the other categories the protocols are not unanimous in their focus. All in all, the National Museum's protocol has the most categories of what should be included in the zooarchaeological report.

	ICAZ	**National Museum**	**Aquincum Museum**	**Archaeological Norms**
Report	Yes	Yes	Yes	Inventory
Archaeological context	Yes	Yes	No	Yes
Sample size	Yes	-	Yes	-
Cultural context	-	Yes	Yes	No
Faunal list	-	Yes	Yes	Yes
Withers height calculations	-	Yes	No	No
Weight	-	No	Yes	No
Meat processing	-	Yes	Yes	Yes
Diet	-	Yes	Yes	No
Distribution of bones	-	Yes	Yes	No
Orientation	-	Yes	No	n.a.
Worked bones	-	Yes	Yes	Yes
Pathology	-	Yes	No	Yes
Comparative analysis	-	No	Yes	No

Fig. 6: The content of a zooarchaeological report as defined in zooarchaeological protocols

4.6. A brief summary of the protocols' analysis

The analysis of selected Hungarian protocols and related documents has clearly shown that there is a lack of an unified approach in almost every general topic of the protocols in Hungary. The examined documents clearly had, in general, other focal points (e.g. the content of the zooarchaeological report), while some topics such as health risks, general conditions of storage, or access to collections and zooarchaeological data were completely left out from all the documents. Some of the documents contain more precise description on certain topics such as sampling or on-site documentation, but represent another genre rather than protocol.

This lack of a general approach narrows down the possibilities of the researchers and makes the comparative analysis on zooarchaeological data more difficult. In addition,it often leads to significant loss of data or biased research results.

5. Case Study No. 1: Százhalombatta-Földvár[48]

Type: Large-scale, planned Bronze-Age tell excavation – settlement context

5.1. Introduction - SAX

The archaeological site of Százhalombatta-Földvár is located along the western bank of the Danube, around 30 kilometres south of Budapest, Hungary. The first two excavation campaigns took place in 1963 and from 1989-1993. Most recent excavations of the Bronze Age fortified tell settlement started in 1998, and are ongoing within the framework of the Százhalombatta Archaeological eXpedition (hereafter SAX). SAX started as a Hungarian-Swedish joint project with the involvement of the University of Göteborg and the Swedish National Heritage Board. The project was initially planned for five years, but lengthened with increased the number of universities involved.[49] Now the excavations are directed by Magdolna Vicze (Százhalombatta, Matrica Museum), Marie Louise Sørensen (University of Cambridge), and Joanna Soafer (University of Southampton).

The site is an outstanding example of good practice due to its detailed excavation strategy, and well developed methods of systematic sampling, dry-sieving, flotation, documentation and use of informatics. All of this makes the SAX project highly relevant for the topic and for this thesis. SAX's strength also lies in the regular involvement of experts from various fields of archaeology such as environmental archaeology, geoarchaeology, archaeobotany, zooarchaeology, soil-micromorphology, and ceramic analysis. Not only did

[48] Some of the information is based on my archaeological work experience on the site in July 2015 , and on the one hour structured interview with excavation director, and director of the Matrica Museum (Százhalombatta), Magdolna Vicze, PhD at Százhalombatta-Földvár excavation site on July 14, 2015. The interview was done and recorded by Gergő Paukovics in the form of written notes.
[49] Magdolna Vicze, "A Százhalombatta Projekt által alkalmazott ásatási technika" [Excavation Method Utilised by the Százhalombatta Project] in: *Régészeti Kutatások Magyarországon 2002* [Archaeological Investigations in Hungary 2002], ed. Júlia Kisfaludi (Budapest, 2004), 1.

the excavation strategy, methodology, and the documentation play an important role in the project, but also publication and dissemination. The importance of consecutive publication of new results in leading archaeological journals, monographs, books, and conferences cannot be stressed enough. In this manner the SAX project has been outstanding in Hungary as well.[50]

The highlighted aims of the SAX project are to investigate the settlement hierarchy (or heterarchy)[51] of Bronze Age settlements and the role Százhalombatta played in this hierarchy. Secondly, to examine the settlement structure and architecture, the use of space (also on the household level), daily life, technology, and material culture.[52] It should be also emphasised that due to the well-developed soil and micromorphological sampling strategies many other possibilities opened for SAX to refine its research questions and also to ask new ones. Without the applied methods, research questions such as the functions of different spaces within a household or questions about harvesting and food processing could not be approached.[53]

5.2. Excavation methodology

The SAX project had two main aims from the planning period of the excavations. First, an extensive investigation of the Bronze Age settlements in the surrounding area of the

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[50] For the list of relevant publications see: The Százhalombatta Archaeological Expedition, "Publications," http://szazhalombattaexcavation.info/outputs/publications/; The Százhalombatta Archaeological Expedition, "Conference Presentations," http://szazhalombattaexcavation.info/outputs/conference-presentations/

[51] Heterarchy: "a settlement network made up of communities some equal in rank" [Timothy K. Earle et al., "Bronze Age Landscapes in the Benta Valley. Research on the Hinterland of Bronze Age Centres," *Hungarian Archaeology* (2012 Winter): 2.]

[52] Magdolna Vicze, Joanna Soafer, and Marie Louise Stig Sørensen, "Glimpsing Social Organisation – Evidence from the Bronze Age Tell at Százhalombatta-Földvár," *Hungarian Archaeology* (2014 Summer): 1.; "A Százhalombatta Projekt," 1.

[53] Ildikó Poroszlai et al., "Use of Informatics at the Százhalombatta Tell Excavation," in *Archaeological and Cultural Heritage Preservation within the Light of New Technologies. Selected papers from the joint Archaeolingua-EPOCH workshop, 27 September-2 October 2004, Százhalombatta, Hungary,* ed. Erzsébet Jerem, Zsolt Mester, and Réka Benczes, (Budapest: Archaeolingua, 2006), 121.

site, in the Benta valley; Second, a well-developed and detailed excavation on the tell site.[54] Publications on excavation methodology belonged to the basic concept form the beginning, an approach rarely taken in Hungary although it should be an essential part of every excavation report.[55] The excavation and the used methods were planned carefully and improved and refined constantly.[56] To develop the appropriate excavation methodology was crucial because it was agreed on at the very beginning that trial excavations in the area must also follow the same methods.[57] The excavation is unique, not only in its methods, but also in its size.[58] Geo-archaeological investigations were conducted prior to the excavations, between 1997 and 1999. A special coring device was developed based on geological techniques. The method was tried to detect the thickness of culture layers and determine something about the stratigraphy of the tell. Altogether 338 cores samples were taken boring on the site after which the 20 metres by 20 metres trench was opened.[59] In terms of its size Százhalombatta-Földvár remains the largest Bronze Age tell excavation in Central Europe.[60]

The project also abandoned the traditional type of excavation unit and a 2 metres by 2 metres grid system was introduced. These squares form the basis of the grid system and are the largest excavation units. Each square has its own documentation-sheet, indicating the amount of soil removed, the number of find-bags, special finds with 3-dimensional point of provenance, the characteristics of the soil, and the coordinates of the taken soil samples are noted. All the general and special finds, general and special soil samples (stake-holes, post-

[54] Vicze, "A Százhalombatta Projekt," 1.

[55] Magdolna Vicze, "Excavation Methods and Some Preliminary Results of the SAX Project," in *Százhalombatta Archaeological Expedition SAX Report 2. Field Seasons 2000-2003*, ed. Ildikó Poroszlai and Magdolna Vicze (Százhalombatta: Matrica Museum, 2005): 65-80.; Magdolna Vicze and Ildikó Poroszlai, "Methodological Background of a Modern Tell Excavation in Hungary," in: *Einflüsse und Kontakte Alteuropäischer Kulturen. Festschrift für Jozef Vladár zum 70. Geburtstag*, ed. Jozef Bátora, et al. Václav Furmánek, and Ladislav Veliačik, (Nitra: Archäologisches Institut der Slowakischen Akademie der Wissenschaften, 2004), 231-240.

[56] Vicze, "A Százhalombatta Projekt," 1.; From the interview with Magdolna Vicze

[57] Vicze, "A Százhalombatta Projekt," 1.; Earle et al., "Bronze Age Landscapes in the Benta Valley," 1.

[58] Magdolna Vicze, "Expecting the Unexpected: Százhalombatta-Földvár Surprises Once Again," in *Counterpoint: Essays in Archaeology and Heritage Studies in Honour of Professor Kristian Kristiansen*, ed. Sophie Bergerbrant and Serena Sabatini, BAR International Series 2508 (2013), 71.

[59] Vicze, "A Százhalombatta Projekt," 2.

[60] Vicze et al., "Glimpsing Social Organisation," 2.

hole, micromorphology samples, etc.) are excavated, documented, and packed within these entities.[61] Every unique feature, occurrences, stake-holes, post-holes, etc. are documented and drawn on the other side of the documentation-sheet of the unit. Narrative description of the unit is used to describe the characteristics of the unit as well. The narrative description is recorded on the same documentation-sheet.[62]

Archaeological features smaller than 3-4 metres in width or diameter are considered as separate units. Therefore their material is also documented separately, but with the same recording-sheet to ensure consistent data recording.[63] This is essential when dealing with pits from the Middle Bronze Age. The use and function of these pits made by 'Vatya' settlers are not yet clarified and, thus are given special attention. They are recoded separately with identification number, excavated and recorded layer by layer where finds and soils samples are handled separately by layers.[64]

Because the excavation has a special focus on the use of space at the household level, the identified houses and their debris are subdivided into smaller units, each of them 1 metre by 1 metre. This method was used from the beginning of the excavation campaign. All removed soil is dry-sieved, and 10 litres of soil samples are taken, Special finds such as tools, pots, and charcoal are measured and their find spot immediately registered using the total-station. This allows a more in-depth investigation of the households in 3-dimensions.[65]

[61] Vicze, "A Százhalombatta Projekt," 3.
[62] Ibid., 4.
[63] Ibid., 4.
[64] Ibid., 4-5.
[65] Ibid., 4.

5.2.1. Recovery and dry-sieving

The basic excavation method is hand-collecting. Thus in the first years of the excavation, 50 litres (a wheelbarrow) of soil was dry-sieved from each archaeological unit in order to get clearer picture of the site, and a broader spectrum of the find types.[66] After the trial period of dry-sieving, from 2002, the SAX Project applies systematic dry-sieving on the site. Every bucket of soil is sieved through a mesh size of 1.5 cm (Figure 8). Three sieves operate in parallel on the excavation (Figure 7).

Fig. 7: The excavation site of Százhalombatta-Földvár with the tree dry-sieving stations (Photo: Gergő Paukovics, with the permission of the Matrica Museum, Százhalombatta)

Every excavator has his or her own, marked aluminium bucket. The buckets are marked with a scale inside the bucket so the volume of the soil is easily readable during the excavation. Every bucket of soil is dry-sieved after it is filled to 10 litres. The amount is marked on the documentation-sheet of the unit. The wheelbarrow represents a bigger unit in

[66] Ibid., 3.; From the interview with Magdolna Vicze

counting the amount of removed soil from a unit. One wheelbarrow is counted as fifty litres of soil. Wheelbarrows are not used in the trench anymore because of its depth, but it remained on the paper documentation to facilitate the overview of the amount of removed soil. The only exception is if the feature contains less than 10 litres of soil. After the dry sieving the excavator get their buckets back and sort the contents by type (ceramic, bone, daub, lithic, vitrified clay, charcoal, peddles, shell, metal, other) into the find-bags. Although the number of excavators are high (sometimes more than one person is working in an excavation unit), which means more attention to a selected area, the number of finds coming back from dry-sieving is often high.

Fig. 8: Dry-sieving station, mesh, and the process of dry-sieving (Photo: Gergő Paukovics, with the permission of the Matrica Museum, Százhalombatta)

5.2.2. Sampling

Every sample (generally 10 litres – Figure 9) is recorded with the total-station three-dimensionally. The plastic bags are labelled with a water resistant “Sharpie” pen. The label includes: the name of the site (SZHB-FV: stands for Százhalombatta-Földvár), the date of the sample is taken (in English format: e.g. 14 July 2015), the number of the excavation unit (e.g. 7423) which is marked with a frame, why the sample was taken (e.g. flotation sample), and the individual number of the sample which is recorded by the total-station (Figure 10). A paper-sheet with the same data is placed inside the sample bag. The sheet is wrapped with aluminium foil which prevent the paper from getting wet. The aluminium wrapped paper float on top of the water during flotation and in this way they can be easily separated. Soil from post-holes and stake-holes is always taken fully for flotation. Every soil and flotation sample is labelled, recorded, and documented in the same way. Specialists may recommend or advise that individual samples should be taken for phytolith examination, soil micromorphology, petrology, lipid, or charcoal analysis. These samples are taken by the specialists and handled with particular care (e.g. ceramics with possible lipid remains are kept in special dry, dark and cool conditions) in order to rule out contamination of the samples which become vulnerable after recovery to bacteria, fungi, or algae.[67]

No discarding or retention policies apply at the Matrica Museum where the finds are being cleaned, stored, and analysed. The Matrica Museum is strict about the policy that everything must be stored and be available for future research, although the museum is unfortunately facing issues with storage.[68] As stated by Magdolna Vicze, financial issues never played a role in the excavation and sampling methods, or storage. At present, the

[67] Richard P. Evershed, “Biomolecular Archaeology and Lipids,” *World Archaeology* 25, no. 1 (1993): 88.; Gill Campbell et al., *Environmental Archaeology. A guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-excavation (Second Edition)* (Swindon: English Heritage, 2011), 14-15.
[68] From the interview with Magdolna Vicze

directors of the excavation are very strict about the consequent documentation and the policy of "keeping everything."[69]

Fig. 9: Stages of sampling (Photo: Gergő Paukovics, with the permission of the Matrica Museum, Százhalombatta)

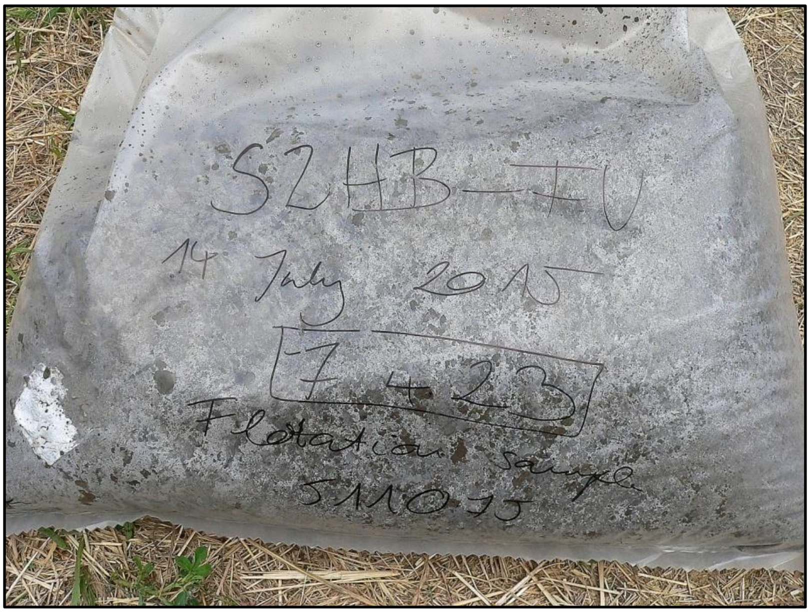

Fig. 10: A labeled flotation sample with the data. In the bottom left corner of the sample the inner record note wrapped in aluminum foil is clearly visible (Photo: Gergő Paukovics, with the permission of the Matrica Museum, Százhalombatta)

[69] From the interview with Magdolna Vicze

5.2.3. Flotation

Floatation samples are taken from every archaeological unit and special context (post-holes, stake-holes, etc.). The standard sample size for flotation is 10 litres of soil, taken from the general matrix of the units. This means an average of 300-600 samples annually.[70] The flotation takes place at the museum in the so-called dirty-lab, usually parallel to the excavation.[71] The heavy fractions[72] are separated by size of the residue as they go through different mesh sizes: 4 millimetre (mm), 2 mm, 1 mm, and 0.5 mm. Of course this means a lot of material and there are an average of 500 flotation samples annually. So after sorting the heavy fraction by size, samples are taken from the different fractions: 1 decilitre from the 2 mm fraction, and 0.5 decilitre from the 1 mm and the 0.5 mm fraction.[73]

The fractions are sorted out by size, but they are kept together as a context. Small fractions are kept for microscopic or chemical analysis. All the samples are taken for long-term storage even though some of them may have to wait for many years to be analysed. Three microscopes are utilised for checking the primary selection of light fraction samples. Students sort the light fractions into categories which makes the process faster for the archaeobotanists, micro-faunal specialists, or archaeoichtyologists (specialists in archaeological fish remains).[74]

The number of known animal species has doubled since systematic flotation was introduced, and heavy fractions from the floated samples were analysed. Flotation also helped reveal the fact that some plant remains such as peas, chickpeas, or lentils sink into the heavy fraction by flotation (Figure 11 and 12).

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[70] Vicze, “A Százhalombatta Projekt,” 5.
[71] Ibid., 7.
[72] Heavy fraction: the residue remaining on the bottom of the flotation sieve (usually stone, burned clay, pottery sherds, bones, etc.); light fraction: the ones that float on the water of the flotation machine (carbonised plant remains, small bones, etc.)
[73] Vicze, “A Százhalombatta Projekt,” 16, Fig. 9.
[74] Ibid., 7.

Fig. 11: Heavy fractions from flotation samples after sorted by forceps. (a) *Bone, charcoal, shell, and seed remains.* (b) *Bone, burnt seed, and charcoal remains.* (c) *1mm bone, shell and charcoal remains. (Photo: Gergő Paukovics, with the permission of the Matrica Museum, Százhalombatta)*

5.2.4. Bioarchaeological data

As any other material, animal bones, shells, and often concentration of burnt seeds are collected by hand at Százhalombatta-Földvár. After recovery animal bones are bagged into large, or smaller (depending on the site of the unit) paper bags. Excavators usually use two bags to make the bags stronger. The bags are labelled on the outside with the name of the site, the date, the type of data, and with the number of the excavation unit. Inside the bags comes an inner record note with the same data. The record note is wrapped with aluminium foil the same way as in soil samples. This is important for the cleaning stage when the bags are emptied into water. The wrapped record notes float on the water without getting soaked.

Animal Bone Groups (hereafter ABG)[75] represents high research and interpretation values. Their size can vary from a few number of bones to complete skeletons. They are present from all periods and carry information about the circumstances of deposition and taphonomic processes. They have great potential in biometric studies, pathologies, and also in radiocarbon dating.[76] At Százhalombatta-Földvár, ABGs are handled with a special interest, because only bioarchaeological methods are able to address some research questions.[77] Every ABG is recorded with photographs, drawings, and measured with three-dimensional coordinates with the total-station. They are also recovered and bagged separately, but labelled based on the same principles as described before for animal bones or soil samples.[78]

[75] ABG also referred to Associated Bone Group occasionally. Here I use the more neutral term animal bone group as it is suggested for the terminology by James Morris, "Animal Bone Groups," in Baker and Worley, Animal Bones and Archaeology, 13. For the use of Associated Bone Group see: James Morris, "Associated Bone Groups; One Archaeologist's Rubbish is Another's Ritual Deposition," in *Changing Perspectives on the First Millennium BC: Proceedings of the Iron Age Research Student Seminar*, ed. Oliver Davis, Niall Sharples, and Kate Waddington, Cardiff Studies in Archaeology, (Oxford: Oxbox, 2008), 83-98.; James Morris, "Associated Bone Groups Beyond the Iron Age," in *Integrating Social and Environmental Archaeologies: Reconsidering Deposition*, ed. James Morris, and Mark Maltby, (Oxford: British Archaeological Reports International Series 2077, 2010), 12-23.

[76] Baker and Worley, *Animal Bones and Archaeology*, 14.

[77] Poroszlai et al., "Use of Informatics," 121-122.

[78] From the interview with Magdolna Vicze

Furthermore, a number of the bioarchaeological finds are given special attention: horncores,[79] antlers, horse bones, shells, fish bones, and small mammal bones are measured with the total station and recorded as special finds on the unit's documentation-sheet. These finds are bagged separately but kept together with their context. The large number of categories of specially handled bioarchaeological find also demonstrates the deep understanding of the importance of bioarchaeology by the archaeologists of the SAX Project.

Fig. 12: Heavy fractions from flotation in Petri dishes. They are stored in labeled seal-again polythene bags. (a) *Fractured and intact bones.* (b) *Bone fractures with fish vertebrae.* (c) *Burnt seeds.* (d) *Bone fractures with rodent teeth. (Photo: Gergő Paukovics, with the permission of the Matrica Museum, Százhalombatta)*

5.2.5. Digital archiving

The digitalisation process of data at SAX takes place in parallel with the excavation work. All 3-dimensional data from the total-station is imported into INTRASIS (Intra-site

[79] Horncore: the bony central part of an animal's horn (e.g. cattle, goat, etc.). The bone is surrounded usually with a covering of keratin and other proteins which are more exposed to decomposition in an archaeological context.

Information System) database system at the end of each day. It is an important routine, because otherwise the amount of data would accumulate, slowing down post-excavation processes as well.[80] INTRASIS is a Swedish software specially developed for archaeological use. It was introduced at SAX in 2003.[81] Before the INTRASIS, the Swedish software DAD was also used for the digital recording.[82] Each record in the INTRASIS database consists of the geo-data for archaeological features and objects, attribute data (attributed archaeological and statistical information), relations of a record (spatial, contextual, and stratigraphical connections, photos), and textual information (observations, interpretations, etc.).[83]

All the data is stored in zip format on a hard disc, and on a backup in order to save space. The security level of the INTRASIS database system is high, and it is protected with individual password. Changing and deleting data is only allowed at the administrator level of the software. Every new entry, change or deleting data are noted and saved by the software in the history file. The software is designed to be compatible with Geographical Information System (GIS) software such as Arcview GIS, or QGIS. This is essential for analysing and presenting the data from the excavation. The data can be exported from INTRANET into MS Excel as well where data can be easily organised in table formats.[84]

[80] Vicze, "A Százhalombatta Projekt," 7.
[81] Poroszlai et al., "Use of Informatics," 126.
[82] From personal communication with Péter Mali, archaeologist at the Matrica Museum at the time of my research in July 2015. At the present he is employed by the János Damjanich Museum, Szolnok, Hungary.
[83] Poroszlai et al., "Use of Informatics," 126-127.
[84] Ibid., 127.

6. Case Study No. 2: Pomáz-Nagykovácsi-puszta

Type: Small scale planned - rural monastic context

6.1. Introduction

The site of Pomáz-Nagykovácsi-puszta is located in the Pilis Mountains, about 30 kilometres north of Budapest. The ruins on the small hill were already recognized by local historians in the nineteenth century. It was also well known that in the Middle Ages many monastic communities settled in the Pilis Mountains. Thus, the research at Pomáz-Nagykovácsi-puszta followed the general approach to monastic research in Hungary.[85]

The site was first surveyed and drawn by László Krompecher, a professor at the Technical University in Budapest, in 1927. He carried out the first excavation campaigns with his students in the following years. As an amateur in the field of archaeology his methods did not follow professional standards. He published two articles in which he identified the site as the Cistercian abbey of Pilis.[86]

Later on, Sándor Sashegyi, a local amateur archaeologist, surveyed the ruins and reinterpreted the building complex as the Holy Cross Monastery of the Pauline order.[87] Both of the theories were later refuted by other excavations in the Pilis region. First, the Cistercian monastery of Pilis was identified by László Gerevich about 10 kilometres from the site, at Pilisszentkereszt. Soon after István Méri and Júlia Kovalovszki located the Pauline monastery

[85] József Laszlovszky et al., "The 'Glass Church' in the Pilis Mountains. The Long and Complex History of an Árpád Period Village Church," *Hungarian Archaeology* (2014 Winter): 1.

[86] László Krompecher, "A pilisi ciszterci apátság és a pilisszentkeresztnek szentelt pilisi pálos kolostor építészeti maradványai [Architectural remains of the Cistercian abbey of Pilis and the Pauline monastery of Pillis dedicated to the Holy Cross of the Pilis]," *A Magyar Mérnök- és Építész-Egylet Közlönye* 49–50, 9 December (1928): 329–333.; László Krompecher, "A pilisi apátság romjainak fellelése [Discovery of the ruins of the Pilis abbey]," *Technika. A Magyar Mérnökök Lapja* 15 (1934): 36–37.

[87] János Beliczky and Sándor Sashegyi, *Pomáz*. A Magyar Föld és Emlékei [Hungary and its heritage] (Budapest: Belitzky, 1939), 20-22.

near Kesztölc, approximately 30 kilometres north-west from Pomáz-Nagykovácsi-puszta.[88] After the Second World War, the site was nationalised by the Hungarian state and warehouses were built for a pharmaceutical company. The company used the site up to the late 1990s[89] (there is still a lot of waste from pharmaceutical products around the site). Although there were some surveys, and new theories came up during this period, research on the site was generally suspended with the exception of an archaeological topographic survey in the 1980s, when the village of Kovácsi was detected just across the road, running by the foot of the hill where the building complex is located.[90]

A new interpretation was offered in 2009 by József Laszlovszky (director of the on-going excavations at Pomáz-Nagykovácsi-puszta) based on historical and archaeological sources. A charter dating from 1254 proves that the village was owned by the Cistercian abbey of Pilis and most probably it remained so for centuries.[91]

The site now lies on private property. The still on-going excavations began in 2011 with the support of the owner. The excavations date the church back most probably to the second half of the twelfth century (Figure 13). Extensive research was carried out on the architecture of the church, and the changes in its surrounding when a Cistercian grange (manorial complex) was built around it. Some Árpád period graves were unearthed around it

[88] Laszlovszky et al., "The 'Glass Church' in the Pilis Mountains," 2.; For the publications on the monasteries see: Júlia Kovalovszki, "A pálos remeték Szent Kereszt-kolostora (Méri István ásatása Klastrompusztán) [The Holy Cross monastery of the Pauline hermits (The excavation of István Méri at Klastrompuszta)]," *Communicationes Archaeologicae Hungariae* (1992), 173-207.; László Gerevich, "Pilis Abbey, a Cultural Center," *Acta Archaeologica Academiae Scientiarum Hungaricae* 29 (1977), 155–198; László Gerevich, "Grabmal der Gertrud von Andechs-Meranien in Pilis," in *Sankt Elisabeth. Fürstin, Dienerin, Heilige,* ed. Phillips-Universität Marburg, Ausstellungkatalog (Siegmaringen: Thorbecke, 1981), 334–335.; László Gerevich, "Ergebnisse der Ausgrabungen in der Zisterzienserabtei Pilis," *Acta Archaeologica Academiae Scientiarum Hungaricae* 38, no. 1-2. (1985): 115–152.

[89] Laszlovszky et al., "The 'Glass Church' in the Pilis Mountains," 3.

[90] Ibid., 3.

[91] József Laszlovszky, "Ciszterci vagy pálos? A Pomáz-Nagykovácsi-Pusztán található középkori épületmaradványok azonosítása [Cistercian or Pauline? Identifiation of the medieval architectural remains located at Pilis-Nagykovácsi-puszta]," in: *A ciszterci rend Magyarországon és Közép-Európában* [The Cistercian order in Hungary and Central Europe], ed. Barnabás Guitman (Piliscsaba: Pázmány Péter Katolikus Egyetem Bölcsészettudományi Kar, 2009), 191–208.

along the northern and southern side of the church and its wings (Figure 14).[92] One of the most important results is the identification of the glass-producing workshop in the building complex, identified by the enormous amount of glass shards, unfinished products, and furnace remains which has been recovered.[93] Archaeological material also revealed that later on, in the sixteenth or seventeenth century, the site was used to some extent for military purposes.[94]

6.2. Excavation methodology: current situation

Because there has not been sufficient published information on the applied excavation methods used at Pomáz-Nagykovácsi-puszta, all the information collected and demonstrated here derive from my personal experiences as an excavator on the site during the excavation campaign from June to August, 2015. Furthermore, I was given information about methods and documentation from personal communication with József Laszlovszky, the director of the excavation and field archaeologists who have been working on the site for a longer period.

The excavation staff consists of archaeologists and students. The number and the working experience of the excavators vary widely. PhD, and MA students from the Medieval Studies Department at Central European University (Budapest) and students in archaeology from the Eötvös Loránd University (Budapest) regularly participate in the fieldwork, occasionally with no previous fieldwork experience in archaeology. The excavation has a high educational and interpretative value. József Laszlovszky, together with the team of students and archaeologists, wants to turn the excavation into an archaeological and educational field school.

[92] Laszlovszky et al., "The 'Glass Church' in the Pilis Mountains," 8.
[93] Ibid., 10.; József Laszlovszky, "Középkori templom és üveggyártó műhely feltárása: rövid jelentés. Pomáz, Nagykovácsi-puszta [Unearthing a medieval church and glass production workshop: Short report. Pomáz, Nagykovácsi-puszta]," *Archaeologia – Altum Castrum Online* (2012): 1-4, accessed on August 22, 2015, http://archeologia.hu/kozepkori-templom-es-uveggyarto-muhely
[94] Laszlovszky et al., "The 'Glass Church' in the Pilis Mountains," 10.

The importance of archaeological protocols, and especially specialist protocols, was stressed in the previous chapters, but here it should be stated that protocols become even more important in cases where staff has no previous experience. For all these reasons, and especially because emphasis will be put on education and training in the future, it is important to develop and implement archaeological protocols at Pomáz. After providing an overview of the current situation the next subchapter contributes to this task.

The general method used in excavation is hand-collecting. The site is documented in a ten metres by ten metres coordinate system adjusted to the workshop buildings. This is also the basis of the documentation. Each bag of finds or special finds gets an Individual Record Number (*Gyűjteményi Napló Szám*). The digitalisation of the excavation diaries, notes, drawings, section drawings, and materials is on-going. Some non-systematic sampling was carried out at the site since the beginning of the new excavation campaigns in 2011.

Fig. 13: View of the excavation site of Pomáz-Nagykovácsi-puszta from the apse of the church (Photo: Gergő Paukovics, with the permission of József Laszlovszky)

Finds are generally hand-collected into plastic trays, which should be avoided in the future, because this way they can be easily lost, capsized, or exchanged. It also slows down the on-site documentation which should be carried out parallel to the recovery by the excavator of the unit. The current method can also result in samples and finds lacking any proper documentation. It should be mentioned that the 'laziness' of the excavator often results in new headaches for the staff of the next campaign, especially at sites where the composition of the excavating team changes each year.

The management of the unearthed soil is rather problematic. At the site, every bucket of unearthed soil is dry-sieved with a 3 mm mesh sized sieve. The small residue is filled back to protect the walls of the church from inside and out. Because of the sediment type at the site there is always a large amount of soil which cannot be sieved through the mesh. This soil is piled up around the site on pieces of plastic flooring or plastic foils. After the soil is divided in this way, the adhering sediments are checked by a metal-detectorist (the site has a large amount of metal finds).

There are two main reasons why this system of process should be changed. First and foremost, the size of the mesh is insufficient for this type of sediment to be dry-sieved. When the unearthed soil is still humid or semi-solid clings (lumps) together. When the soil dries out it is really hard to disaggregate by hand, so there is a likelihood of overlooking finds that remain in lumps of clayish sediment. This results in really hard and time-consuming work with the sieving. There are two sieves, but usually only one person is sieving. The number of excavators is much higher, resulting in a lot more unearthed soil than one person can dry-sieve. Therefore the unearthed soil often piles up around the excavation site and the soil dries out. This method is time and space consuming.

Second the employment of the metal-detectorist slows down the whole process as the employed person is not visiting the site on a daily basis. This results piles and piles of unearthed soil waiting to be checked by the detectorist. The lack of space results occasionally in mixing of different soils to a certain extent. This only adds to the fact that the big pieces of plastic flooring have holes in them in many places so that the unearthed soil becomes mixed with the top soil on which the flooring is laid.

All these issues can be resolved with simplification of the processes. Efficient dry-sieving can be achieved by bigger mesh size and judgemental sampling for dry-sieving. This should be based on the material potentially present in the samples and refined research questions. This will increase recovery bias but resolve the issue of the unearthed soil piling up and mixed. The number of staff for sieving can be also increased for more efficiency, but in any case, the sieving process should always beon-going in parallel to the excavation. The most efficient methodological approach would be to exclude metal-detecting from the process. The metal should be picked up during dry-sieving!

Fig. 14: Graves from Pomáz-Nagykovácsi-puszta. (a) *Grave of an infant, buried outside the church right next to the wall. All the unearthed soil was dry-sieved through a 3mm mesh. Flotation samples were taken from round the skeleton.* (b) *Soil samples were taken from parts of the feet and pelvis. The soil was entirely dry-sieved. Phalanges with pathological features were detected from dry-sieving.* (c) *Samples were taken also from the area around the skulls. (Photo: Gergő Paukovics, with the permission of László Laszlovszky)*

Because of all the aforementioned issues, it is important not only to develop sampling and bioarchaeological protocols, but also to develop more cost and time-efficient protocols especially adjusted to conditions on the site. The Chapter 8 contributes to this task in order to develop a better and hopefully in the near future, an outstanding excavation protocol for the Pomáz-Nagykovácsi-puszta project.

7. Case Study No. 3: Hungate Project, York Archaeological Trust[95]

Type: Big faunal assemblages from a large-scale development site - urban context

7.1. Introduction

Large scale excavations “pose a different set of challenges for zooarchaeologists and curators”[96] compared with the small, planned excavations from the previous cases. There are two main issues concerned: 1) capacity, time, and financial constraints on analysis; 2) long-term archiving of the assemblage. In order to try to resolve both these problems, the York Archaeological Trust developed various post-excavation and curation strategies for the animal bone assemblages from the Hungate excavations, York, UK.

Hungate is situated on the banks of the River Foss at the south-eastern edge of York’s city centre. It has been the biggest excavation ever in the city, covering over 2000 years of archaeological materials. Excavations were carried out by YAT from 2006 to 2011 and produced over 800 boxes of faunal assemblages.[97]

The leader of the excavation Peter Connelly, and the then chief zooarchaeologist of the University of York, Terry O’Connor, came out with an idea to develop curation strategies for Hungate because of the vast amount of animal bone material coming from the site. The spare

[95] Some of the data and information are based on personal communication and interviews carried on between April 6th and 13th in 2016 with Nienke van Doorn (Finds Officer, YAT), Clare Rainsford (former faunal remains specialist at the Hungate Project), Ian Milsted (Project Manager, YAT), and Louis Carter (YAT) at York, UK. The research for this dissertation was sponsored by Central European University Foundation, Budapest (CEUBPF). The theses explained herein represent the personal ideas of the author, but do not necessarily reflect the opinion of CEUBPF.
[96] Clare Rainsford, Terry P. O’Connor and Peter Connelly, “The Embarrassment of Riches: Rationalising Faunal Assemblages from Large Urban Sites,” *International Journal of Osteoarchaeology* 26/2 (2014): 221.
[97] Ibid., 222.

storage which was previously provided by the developer was reclaimed for other purposes. Thus, storage of the archaeological material in general and the faunal assemblage in particular, became a crucial issue. This was the turning point for change.[98]

7.2. On the site: From planning to assessment

7.2.1. Hungate Standard Operating Protocol

Hungate Standard Operating Protocol (hereafter H-SOP) was developed in order to develop principles for the recording process of faunal assemblages. H-SOP laid down standards for the forms of records (Concise Record, Recording Form, Context Notes),[99] process of photography (equipment, layout of material for photographs, labelling and archiving),[100] and animal bone identification standards.[101]

7.2.1.1. Forms of Record

In the first month of the H-SOP (May-June 2011), a trial version of the Recording Form was used. After the first month of trialling it was reviewed and altered to the form which is presented here.[102]The initial version was used to record assemblages from three

[98] From personal communication with Clare Rainsford, animal bone specialist at the Hungate Project, PhD Candidate at Bradford University
[99] Rainsford et al., "The Embarrassment of Riches," Appendix S1, Hungate – Standard Operating Protocol, 1.
[100] Ibid., 2-3.
[101] Ibid., 3.
[102] Ibid., 1.

phases.[103] "The important difference to note is the absence of recording of *taxa*[104] relative abundance on this form. This data is therefore absent from later analysis of these phases."[105]

Three types of records were developed for the H-SOP. *Concise Records* contains general information about each assemblage, and the *Recording Form* contains more specific information about the assemblages and their contexts. In addition, *Context Notes* provides further details which could not be recorded in the *Recording Form* or any other means. All forms of records are stored as MS Excel (2010) documents. All *Context Notes* are stored as MS Word (2010) documents.

Concise Record provides information for long-term recording of each assemblage, including the quantity of bone recovered, context type, photograph numbers, the existence of further records associated with that context, the relative value of the assemblage, and recommendations for retention or discard.

A *Recording Form* is completed for each context, and provides data on the specific character of the assemblage, both in terms of representation of taxa and taphonomic information.

Context Notes are free-form notes aiming to provide further information which could not be recorded elsewhere. Some examples include: detailed taphonomic information; description of species recorded as "other mammal" and the skeletal elements present; a record of special deposits of skeletal elements (i.e. deposits of sheep leg bones suggesting some particular activity related to carcass processing went on in that context); recording of any

[103] Clare Rainsford, "Block H1: The Faunal Remains 1550–1950," Unpublished Report Prepared for York Archaeological Trust, 2011, 3-4.
[104] Taxon (plural: taxa): A taxonomic unit. i.e. a population, or group of populations of organisms which are phylogenetically related and which have characters in common which differentiate the unit from other such units. [International Commission on Zoological Nomenclature, *International Code of Zoological Nomenclature*, (Published online, 2000, last updated 2012), 4th edition, s.v. "Taxon", accessed May 23, 2016, http://www.iczn.org/code]
[105] Rainsford et al., "The Embarrassment of Riches," Appendix S1, Hungate – Standard Operating Protocol, 1.

clearly apparent pathologies, worked or unusually-butchered bone; details of unusual skeletal element or species representations. Notes also provide relevant information on aspects of the context from which the animal bone material derived, as recorded by field archaeologists, finds experts, and available from Integrated Archaeological Database (hereafter IADB).[106]

7.2.1.2. Photo-documentation

H-SOP describes the type of digital camera, additional equipment (such as tripoda and lamps), background for photos, and lighting used for images in the digital archive. For photo-archiving large assemblages it was essential to develop a standard layout for the material. Faunal material was organised into taxonomic category. *Mandibles*[107] were photographed upright (held in place with Blu-Tack) with the *occlusal*[108] surfaces of teeth visible so that *tooth wear*[109] data should be retrievable. Individual and close-up shots were taken of anything considered in need of further illustration.

The tray used for assemblage photographs is divided into six sections where each section represents a field in the *Photo Record*. Photo Records contain the following data: phase, context number, photograph number, layout of photograph, and quantity (number of fragments in each photograph). For H2 post-Reformation and Roman contexts, a description of each photograph is also provided in the Photo Record. “The layout of the photographs

[106] Rainsford et al., “The Embarrassment of Riches,” Appendix S1, Hungate – Standard Operating Protocol, 1.
[107] Mandible: lower jaw bone, or jawbone (from Latin *mandibula*, "jawbone")
[108] Occlusal surface: the grinding or biting surface of a tooth, facing the teeth in the other jaw [Simon Hillson, *Teeth*, (Cambridge: Cambridge University Press, 2005), 10.]
[109] Tooth wear: A range of important observations can be made on tooth wear that provide determination of age of death of animals derived from archaeological contexts, nutritional well-being, nature of the food and the amount of grit eaten by the animal. As a result, more and more researchers use mandibles and their associated premolar and molar teeth for calculating age-at-death in order to create harvest profiles as well (Haskel J. Greenfied and Elizabeth R. Arnold, “Absolute age and tooth eruption and wear sequences in sheep and goat: determining age-at-death in zooarchaeology using a modern control sample,” *Journal of Archaeological Science* 35 (2008): 836. doi:10.1016/j.jas.2007.06.003; Elizabeth J. Reitz and Elizabeth S. Wing, *Zooarchaeology*, Cambridge Manuals in Archaeology (Cambridge: Cambridge University Press, 2008. 2nd edition), 174-176.

describes which taxon or skeletal element is located in each section of the tray." All assemblage photos should contain a waterproof Tyvek label (similar to paper but it does not tear) specifying the context number, and a 5cm photographic scale.

All photographs are stored as JPEG files, and labelled in the following format: Context number_photograph number in the specific context (E.g.: 23016_1 describes the first photograph taken of context 23016). The photograph numbers for each context are recorded in the Concise Record, and filed by phase and area of site.[110]

7.2.1.3. Identification

Accurate quantification of animal species was not one of the aims of the project methodology, thus, much material was left unidentified. This material may be identified at some later date. Bird species were identified to the lowest taxonomic level possible. Fish bones were not identified, unless they clearly provided significant information. Sheep and goat bones were not separated due to the difficulty of distinguishing between the two taxa. These finds were recorded as "sheep". Horncores and antlers were handled separately as small finds due to their use in craft industries. They were therefore excluded from analysis.[111]

7.2.2. Hungate Rapid Assessment Protocol

To complement the H-SOP, the Hungate Rapid Assessment Protocol (hereafter H-RAP) was developed for rapid recording of the large quantities of faunal material recovered

[110] Rainsford et al., "The Embarrassment of Riches," Appendix S1, Hungate – Standard Operating Protocol, 2-3.
[111] Ibid., 3.

from the Hungate H2 area (10th-16th centuries). One of the reasons behind the development of H-RAP is also that York has a vast amount of assessed and long-term archived animal bone material from the medieval period (Coppergate, Fishergate, Skeldergate, Walmgate, etc.),[112] which already provides a reliable general picture of York's zooarchaeology.[113] The other reason is that, as in many urban contexts, "the material from Hungate displays an obvious level of reworking and residuality".[114]

YAT's aim "was to develop an adaptable series of principles and recording techniques that could be adjusted according to the quality of the material and the time available."[115] This method was trialled during the excavation and proved to be effective for the rapid recording of large assemblages. Another important result of the H-RAP was that during the process the assemblages were not only recorded, but an assessment was also made assemblages that would otherwise potentially remained unassessed for years or even decades.[116] Assessment was carried out by trained faunal remain specialists, or by volunteers with a level of zooarchaeological experience, under supervision of a specialist.[117]

7.2.2.1. Recording

H-RAP utilises two normative forms of record:

[112] Terry P. O'Connor, "Selected Groups of Bones from Skeldergate and Walmgate," *The Archaeology of York* 15/1 (1984), Council for British Archaeology: London; Terry P. O'Connor, "Bones from the General Accident Site, Tanner Row," *The Archaeology of York* 15/2 (1988), Council for British Archaeology: London; Terry P. O'Connor, "Bones from Anglo-Scandinavian Levels at 16-22 Coppergate," *The Archaeology of York* 15/3 (1989), Council for British Archaeology: London; Terry P. O'Connor, "Bones from 46-54 Fishergate," *The Archaeology of York* 15/4 (1991), Council for British Archaeology: London; Julie M. Bond, Terry P. O'Connor, "Bones from Medieval Deposits at 16-22 Coppergate and Other Sites in York," *The Archaeology of York* 15/5 (1999), Council for British Archaeology: York

[113] Rainsford et al., "The Embarrassment of Riches," 223.; Clare Rainsford, "Faunal Bone Retention Policy: Hungate, York," Unpublished Report Prepared for York Archaeological Trust, July 2013, 1.

[114] Rainsford, Faunal Bone Retention Policy, 1.; Clare Rainsford, "Block H1: The Faunal Remains, 10th–16thCentury & Roman," Unpublished Report Prepared for York Archaeological Trust, 2013, 3-6.

[115] Rainsford et al., "The Embarrassment of Riches," 225.

[116] Idib., 229.

[117] Ibid., Appendix S2, Hungate - Rapid Assessment Protocol, 1.

- *Context Record* corresponds to the Concise Record (see H-SOP) and provides a summary of recorded information. It roughly describes the size of the assemblage (<50 fragments, 50-150, 150>); whether it has been marked for retention (yes/no – default no); the number of fragments retrieved for long-term retention; whether a detailed record has been made; photo numbers.
- *Species Record* corresponds to the Recording Form (see H-SOP). It provides a list of common species found from the site, for which presence/absence (1/0) are recorded. In addition, abundance is marked for cattle, sheep, and pig. Other mammal or bird species of are recorded in the columns marked "Other mammal/bird", detailing all taxa present. The estimated quantity of fragments is provided at the end of the form.

In addition, three types of records may be made: notebook (primarily taphonomic context); photograph (JPEG working shots –H-SOP protocol in not applied); and retrieval form (specimen(s) retrieved, quantity of specimen(s), and reason for retrieval), whenever a specimen is removed from a context for permanent retention.[118]

7.2.3. Faunal Bone Retention Policy

Retention polices applied for Hungate H1 Block Roman, and Post-Medieval H2 Block Roman, Post-Medieval, and D, E, F Blocks Post-Medieval phases.[119]

[118] Ibid., Appendix S2, Hungate - Rapid Assessment Protocol, 1.
[119] Rainsford, Block H1: The Faunal Remains 1550–1950; Clare Rainsford, "Hungate Faunal Report: Other Areas. Blocks D, E, F, Ambulance Station, Focal Building, Link Tunnel and Sewer Diversions 1550-1939," Unpublished Report Prepared for York Archaeological Trust, 2012.; Clare Rainsford, "Block H2: The Faunal Remains 1550–1939," Unpublished Report Prepared for York Archaeological Trust, 2012.; Rainsford, Block H1: The Faunal Remains, 10th–16th Century & Roman; Clare Rainsford, "Statement of Retention and Discard: Prereformation H1," Unpublished Report Prepared for York Archaeological Trust, 2013.

7.2.3.1. Principles and methods

Decisions on retention or discard are taken on a context-by-context basis. Every faunal assemblage from archaeological context in question is assessed briefly. Specialists are documenting details of general condition, taphonomic information, and also quantity data on taxa. The assemblages are photographed in their entirety. The assessment takes into consideration the data from the archaeological context, such as context type and other archaeological finds categories within the same context.[120]

7.2.3.2. Definition of value

Definition of value was developed by Terry O'Connor, and elaborated by Clare Rainsford.[121] It follows the principle that faunal assemblages from different contexts may have different interpretative value as well. This principle is generally accepted in zooarchaeology but is often not acknowledged explicitly.

Definition of value was designed to categorise values demonstrated by assemblages from individual contexts in two major forms: *intrinsic* or *extrinsic*. Intrinsic value may typically, although not exclusively, provide information relevant to the archaeological significance of a particular species. Thus, bones are the research interest within an assemblage, rather than the whole assemblage. Intrinsic value can be separated into two subcategories: *biogeographical* and *chronostratigraphic*.[122]

In the case of extrinsic value, the focus is not on the individual bones, but rather on the full assemblage and its context, and their interpretative value regarding human activity,

[120] Rainsford, "Faunal Bone Retention Policy," 1.
[121] Ibid., 1.
[122] Rainsford et al., "The Embarrassment of the Riches," 224.; Rainsford, "Faunal Bone Retention Policy," 1.; Definitions for *biogeographical*, and *chronostrafigraphic* are explained in Figure 15.

site/deposit formation or site ecology. The four categories of extrinsic value reflecting also the life-cycle of animals from living being to the moment they are brought to light during excavation: *husbandry, utilisation, deposition* and *diagenesis.*[123] Assemblages may display more than one form of value, and are recommended to retention based on their level of assigned value.[124] Categories used are provided and explained in greater detail in Figure 15.

Intrinsic value		
Biogeographical	Assemblage includes species occurring beyond its expected geographical range, making reasonable allowance for known historical changes and reductions of range.	e.g. macaque monkey in mediaeval England; reindeer in Holocene Netherlands
Chronostratigraphic	Assemblage includes species occurring beyond its expected chronological range.	e.g. horse in Neolithic England; white-tailed eagle in post-mediaeval Wales
Type specimens	Assemblage includes specimens of value as exemplars of, or example, pathological conditions.	e.g. 'textbook' specimen of actinomycosis
Extrinsic value		
Husbandry	The assemblage provides substantial information regarding human choices and processes during the animal's lifetime, including rearing of livestock; hunting, fishing or wildfowling strategies; and the presence and lives of commensal animals.	e.g. group of age-attributable mandibles, substantial assemblage of non-domestic birds or fish, and well-stratified rats and mice
Utilisation	The assemblage provides substantial information regarding human activity and processes relating to the animals as carcasses, including butchery, consumption, skinning and other craft-working processes.	e.g. 'single-event' butchery assemblages of primary waste or table waste, bone-working debris, and concentrations of horncores
Deposition	The assemblage provides substantial and informative evidence relating to taphonomic processes, including refuse disposal, which have occurred between the end of human utilisation and incorporation into the deposit.	e.g. evidence of high scavenger impact, crushing and abrasion, and diverse condition of fragments indicating mixed facies within one assemblage
Diagenesis	The assemblage provides substantial and informative evidence regarding the burial environment, and potentially any reworking or reburial processes.	e.g. exceptionally 'fresh' preservation, high degree of secondary mineral deposition, and formation of pyrite and vivianite

Fig. 15: Summary of the assemblage taxonomy proposed for the purposes of retention decisions (after Rainsford et al., "The Embarrassment of the Riches," 224, Table 1.)

7.3. Protocols in practice: The operational chain (Chaîne Opératoire) for animal bones

7.3.1. On-site assessment

The principles for on-site assessment were laid down in the H-SOP and H-RAP all of which were discussed in details previously.

[123] Rainsford et al., "The Embarrassment of the Riches," 224.
[124] Ibid., 223-224.; Rainsford, Faunal Bone Retention Policy, 1.

7.3.2 Post-excavation procedures and storage

The material is cleaned, dried, bagged, labelled and boxed in the Main Office of the YAT (Figure 16 and 17). The Resource Centre only served for long-term storage of the material. The storage system is organised by years, and projects (Figure 19). There are ca. thirty racks reserved for boxes for animal bones. All the racks are labelled with the inventory of the material stored on the shelves of the rack. The faunal material of the Hungate alone takes up 15.000 boxes.

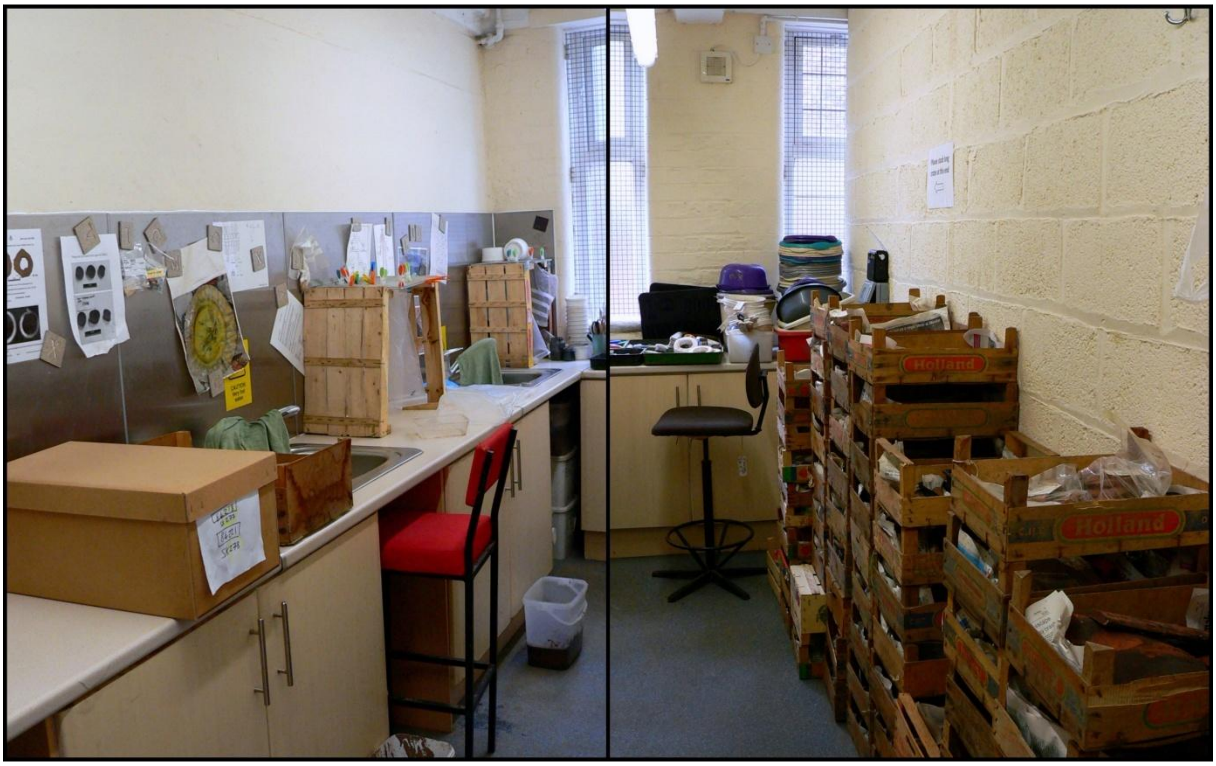

Fig. 16: Cleaning, washing, drying, and temporary storage happens in the Main Office of the YAT (Photo: Gergő Paukovics, with the permission of the York Archaeological Trust)

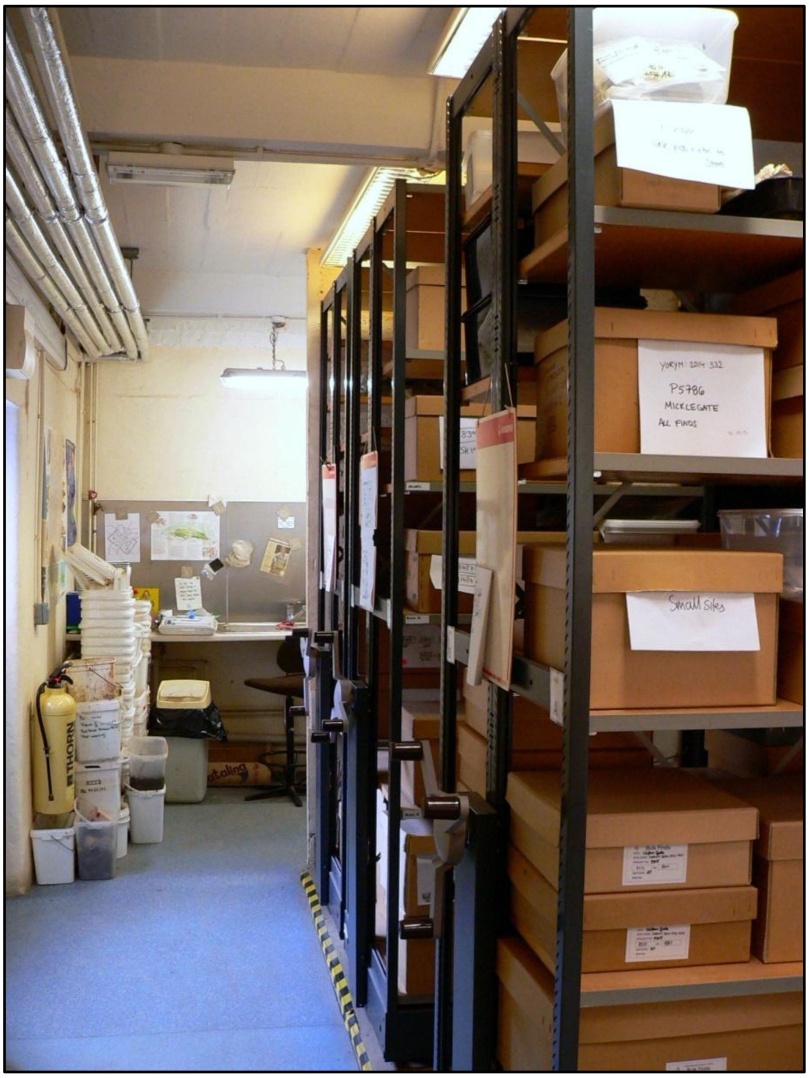

Fig. 17: After cleaning, the material is bagged and boxed again for temporary storage (Photo: Gergő Paukovics, with the permission of the York Archaeological Trust)

The animal bones are kept in "seal again" polythene bags (Figure 18). The bags are labelled by the site code, context number, and the type of the material. Inside the plastic bag there is also a waterproof 8.5cm by 5cm sized Tyvek sheet note with the same information as on the outer side of the plastic bag. Tyvek paper sheets are labelled with "Art line 70 Xylene-free" pens which were recommended by the conservator team at the YAT. They recommendation was based on experiments which proved that it is waterproof and does not harm the material on the long term.[125] The bags are kept in 30cm by 30cm, or 30cm by 50cm big acid-free cardboard boxes (Figure 20).

Fig. 18: Special bones are bagged and labeled separately. Metatarsal bones from a pig with marked pathological condition (arthropathy) (Photo: Gergő Paukovics, with the permission of York Archaeological Trust)

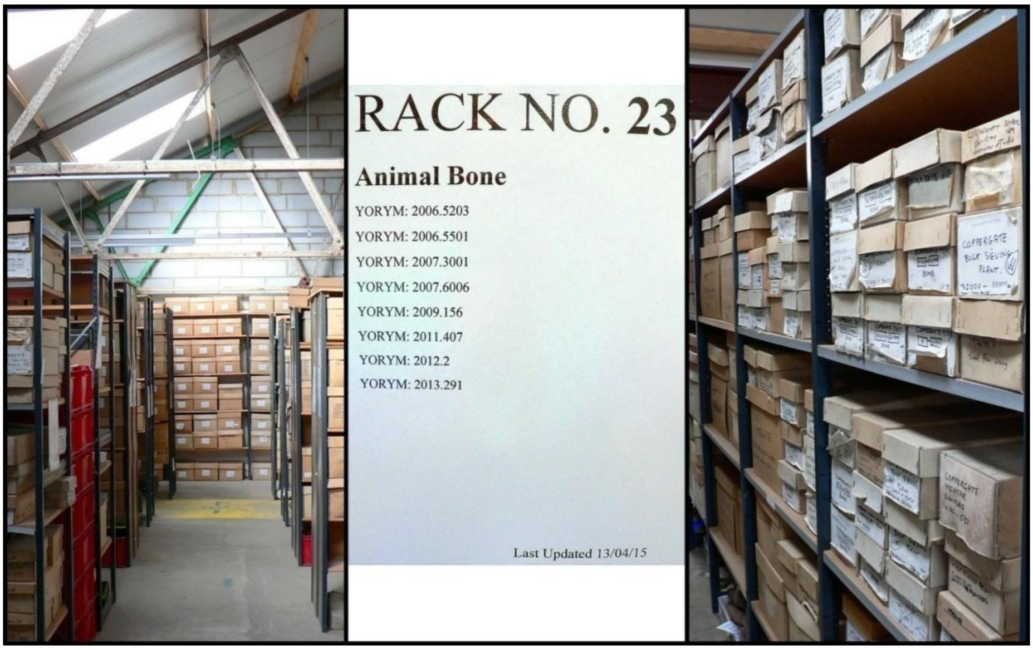

Fig. 19: Racks for animal bones at the YAT's Research Centre at York, Huntington Road (Photo: Gergő Paukovics, with the permission of the York Archaeological Trust)

[125] From personal communication with Nienke van Doorn

Fig. 20: Standard cardboard box and label-formula for storing archaeological materials (Photo: Gergő Paukovics, with the permission of York Archaeological Trust)

The material is kept there until the retention/discarding policies apply (Figure 21 and 22). Re-bagging or repacking the material occurs only if necessary; or if it is part of a project or the material is in bad condition, and the re-boxing is an urgent task. This work is usually done by volunteers.

7.3.4. Archiving: Integrated Archaeological Database

Every find or assemblage is recorded in the Integrated Archaeological Database (hereafter IADB) of the YAT. Servers are provided by an external company. The database contains all the available information on a single object or assemblage in the case of animal bones. If an object is given or passed on to a researcher, to the conservation team, or anyone else for any other reason, it is recorded by name and date in the database. So in this case, discarding means an end to the dataset. No further information is added after discarding which means the further fate of the material is not recorded after the discarding process.

7.3.5. Discarding in Practice

In general practice, animal bone material is not retained unless it has extrinsic or intrinsic research value. This ensures that only material with significant further information potential is kept for long-term archiving beyond the basic record described.[126]

Specialists give advice and recommendations on what to keep and what to discard, but the final decisions are always made by the landowner, museum, or the council. After documentation in the IADB the discarded material is also offered to research institutions, universities, museums for educational purposes. The leftover material is discarded without special care to the general waste and deposited on a wasteland in York, no reburial or other forms of discard are implemented.

[126] Rainsford et al., "The Embarrassment of Riches," 225.

Fig. 21: Discarded materials from York. (a) *Old type of storage* (b) *Paper bags are not lasting* (c) *Discarded material is labeled as well (Photo: Gergő Paukovics, with the permission of York Archaeological Trust)*

Fig. 22: Discarded material from the Hungate Project (Photo: Gergő Paukovics, with the permission of York Archaeological Trust)

8. Proposal for an integrated bioarchaeological protocol for the archaeological site of Pomáz-Nagykovácsi-puszta[127]

It is clear that there is no "one fit for all" in archaeology because every each archaeological site is different and has its own environmental attributes, research questions and values, and even high standard protocols from sites such as Hungate, York or Százhalombatta cannot be adapted in the same way. Here, I have compiled a bioarchaeological protocol with a focus on the faunal remains esspecially for the site of Pomáz-Nagykovácsi-puszta based on my fieldwork experience and research.

8.1. Principles

Excavation strategies and methods greatly influence the composition of bioarchaeological data (e.g. size, represented skeletal elements, fragmentation) therefore they should be planned and implemented with care. Recovery and sampling strategies should be consistent with the general aims of the excavation and research questions.

Communication between field archaeologists, excavation staff, and specialists is highly recommended. It is essential before the excavation to inform the working staff in the field about the basics aims of bioarchaeological methods and finds. They should be able to recognise in time when to seek a specialist's advice. This should be based on a commonly

[127] In order to make this part of the thesis more transparent I only used footnotes where it is refer to a document which was not referenced in other parts of the thesis. Some parts are based on the relevant chapters of Baker and Worley, *Animal Bones and Archaeology*.

agreed terminology. In order to make it easier to understand for staff working on the site or with the bioarchaeological material, the protocol should be bilingual (Hungarian and English).

Although every archaeologist has his or her own favourite group of finds, field of study, or archaeological period; every kind of archaeological find and data should be handled with the same respect on the site and in all stages after recovery. In case of human remains, all staff should follow ethical codes and principles (in the absence of related Hungarian laws or regulations) of the ICOM Code of Ethics for Museums[128] as the standard in Hungary.[129]

8.2. Recovery and documentation

The general method of the excavation is hand collection. Although an experienced team using hand collection can be also sufficient in some cases, many factors influence the effectiveness of hand collection which cannot be influenced by the team (e.g. type and colour of the soil, weather conditions, light conditions, etc.). There are many types of bioarchaeological finds which are often missed by hand collection. This may be due to the size of the animal taxa (e.g. birds, fish, amphibians, molluscs, insects, small mammals, etc.), or the size of the bones or plants (e.g. teeth, digits, phalanges, foetal bones, seeds and plant remains in general, etc.).

Mollusc, fish, amphibian, small mammal, and bird remains should be collected and documented separately.

[128] "Múzeumok etikai kódexe 2004. Budapest, ICOM Magyar Nemzeti Bizottság [ICOM Code of Ethics for Museums 2004]," *Múzeumi Közlemények,* supplement no.2 (2005): 1-19.
[129] Ildikó Pap et al., "Történeti Embertani Protokoll a régészeti feltárások embertani anyagainak kezelésére, alapszintű feldolgozására és elsődleges tudományos vizsgálatára [Historical Anthropological Protocol for recovering, curation, caring and preliminary anthropological investigations of the anthropological materials deriving from archaeological excavation]," *Antropológiai Közlemények* 50 (2009): 105-123.

8.2.1. Bagging

Animal bone material should bagged by context on the site. The best is if they are packed into re-sealable pin-prick perforated polythene bags. Perforation is important, because condensation can build-up after recovery which may lead to deterioration of any kind of archaeological material. Acid-free paper bags can be also be used for the hand-collected bones (but NOT worked bone). However, after the cleaning and drying process, re-bagging of the material into polythene bags is recommended for long-term storage. In the case of paper bags two main factors can affect the bagged material: 1. paper bags are highly exposed to tearing or puncturing by fractured bones, or other pointed or sharp finds; 2. small finds can fall out from the unsealable paper bags, or they can easily get stuck into creases of the paper or at the bottom of the bag. An extra advantage of the polythene bags is their transparency which makes researchers work easier as well. Paper bags can damage the surface of worked bone making later high-magnification research very difficult. To avoid damaging bones in general, the bags should not be over-packed. However, worked bone must be packed individually so as not to damage the surface for further research.

Acid-free paper or plastic individual containers may be used to protect fragile specimens (e.g. bird, fish, or small mammal bones, bones in poor condition, etc.).

8.2.2. Labelling bags

All bags (paper and polythene too) should be labelled with permanent and waterproof ink. All bags should be labelled with the same dataset, using capital letters and Arabic numbers:

- Project name
- Excavation unit number

- Date
- Type of find (e.g. animal bone, human bone, worked bone)
- Individual Record Number of the bag (*Gyűjteményi napló szám*): it should be marked esspecially in order to make archiving easier
- Additional information (e.g. by ABGs or by human remains information about the body part it is belong to; right limb, skull, etc.)
- (In the trial period of the protocol it is worth noting how much comes from dry-sieving)

Record-notes with the same dataset should place inside the bag. The record-note should be waterproofed itself, or it should be wrapped into aluminium foil to prevent it from being damaged by water during the cleaning phase.

8.2.3. Animal Bone Groups and special finds

All Animal Bone Groups (ABG) should be documented separately as they have high research and interpretative value. Photo documentation and drawing of the ABG *in situ* is essential. ABGs should be measured with theodolite or total station as well if it is possible. The bones from the ABG should be bagged separately by anatomical regions (skull, ribcage, right limb, left limb, etc.). The bagged ABG should be kept together. Archaeological context information and additional written description of the ABGs taphonomical conditions should noted. On-site observations are also important, therefore ABSs should be described in written notes.

Worked bones, bird, amphibian, fish, micromammal, and plant remains should be recorded and measured the same way. These types of finds should be bagged separately, but kept together with the material from the context. Worked bones may get Individual Record Numbers, but it should be documented and handled together with the faunal material during the assessment so the worked assemblage does not end up being split into small finds and material discovered during faunal analysis.

8.2.4. Uncertain or mixed contexts

Animal bone material from uncertain or mixed stratigraphical context should be recorded with the context note. The bones may not have any archaeological value, but some bone specimens may have their own intrinsic value.[130]

8.3. Sampling

To avoid biased assemblages, it is desirable to have a thorough sampling strategy. Sampling strategy largely depends on the aims and research questions of the excavation. Furthermore, it is also depends on the type and date of the archaeological context, on sediment type, and on the material potentially present in soil chosen for sampling.

Generally, soil samples usually comprise 10 litres taken from stratified well sealed deposits. By using measured buckets it is easy to calculate the size of the sample. The size of deposit can define the size of the sample as well. If the deposit is less than 10 litres, the whole of the soil within it should be taken for the sample. Samples should be clean of soil from other layers or soil. For the sample It is recommended to use clean, strong polythene bags to hold the sample or, if the bag is not strong enough, than use a double bag. The bag should be labelled as follows:

[130] For the definition of intrinsic value see Case Study No. 3, 7.2.3.2. Definition of value

- Project name
- Stratigraphic/excavation unit number
- Date
- Volume in litres: if it is less or more than 10 litres with reason given for the difference in volume (small layer/feature, specialist sample, etc.)
- Individual Record Number of the sample
- Why the sample was taken (e.g. flotation sample, archaeobotanical sample, grave filling)
- Name of the excavator who took the sample

A record-note should be placed into the sample. The easiest (and cheapest) way is to wrap the record-note in aluminium foil which prevents it from getting wet. Water-resistant material is also recommended, but it should be labelled with waterproof ink.

The samples should be documented in the record-sheet of the excavation unit. The spot from where the sample was taken should be measured on the spot with a theodolite or total-station. If these equipment are not available, than the sample should be manually measured and recorded in the record-sheet/diary.

The most common methods are flotation, and coarse sieving (dry or wet). Dry sieving may be used prior to wet sieving to collect finds which can be damaged by water (e.g. metal artefacts). In Pomáz, water is not available right on the site so the most cost-effective way of fine excavation may prove to be dry sieving.

8.3.1. Special type of remains

Depending on the research questions, the sampling strategy can be modified on the recommendation of a specialist (e.g. archaeobotanist, zooarchaeologist, micromorphologist, etc.) if the layer/feature is rich in bio-archaeological or other type of remains.(always seek advice from the specialist before recovery!). Wherever possible, contexts containing visible microfaunal or fish remains should be sampled in their entirety.

"Inappropriate sieve size can impact significantly on specimen counts (NISP/MNI) and affect taphonomic interpretations (particularly in the case of small mammals). The minimum sieve mesh size must be 0.5mm, in order to recover taxonomically diagnostic loose teeth. A 1.0mm mesh can result in the loss of some small amphibian bones and the smallest mouse molars. A 2.0mm mesh results in the loss of a range of small mammal teeth, bones from small newt and lizard species, and juveniles of any microfaunal species."[131]

8.3.2. Graves

It is recommended that the grave fills and the soil around the skeletal remains be handled more carefully. After the recovery of the skeletal remains and grave goods; artefacts, small or fragmented bones can be missed by hand-collection. These finds are not easy to recognise on the site with the naked eye (carpals, tarsals, hand and foot sesamoids, teeth, screens of 2 and 1 mm mesh can be useful for screening special contexts such as pelvic areas of adult female skeletons when searching for foetal remains, etc.).[132] These layers of soil should be sieved with extra care for those finds or fragments. It is recommended to take whole soil samples from the skull, pelvis, and foot area.

131 Baker and Worley, *Animal Bones and Archaeology,* 40., Table 11.
132 James T. Pokines and Joan E. Baker, "Effects of Recovery Methods," in: *Manual of Forensic Taphonomy*, ed. James T. Pokines and Steven A. Symes (Boca Raton, FL: CRC Press, 2014), 454.

8.3.3. Adhering sediments

Clay or clayish layers/features are easier to screen right after it was taken from the context. If the clay dries out it is harder and time-consuming to screen, because of adhering (lumping) sediments. If there is no possibility to screen the soil immediately after it was taken out of its context, it is recommended that the soil be covered to protect it from drying out. When it is dry, it is really hard to break-up by hand for sieving resulting in a high likelihood of overlooking finds remaining in lumps of clayish soil. In these situations, if it is justifiable, flotation samples may be taken. Aggregated sediments should not force though the mesh.

8.4. Cleaning

Animal (and human) bone material should be cleaned as soon as possible after recovery. Cleaning should be done by experienced staff, by specialists, or by staff supervised by a specialist. Tap water is recommended for cleaning. The bones should be cleaned with care, avoiding further breakage, fragmentation or scratching. Mild or soft toothbrushes, soft-bristled brushes or sponges may be used but NOT coarse brushes. Soaking the bones should be avoided (it also slows down the drying). Fragile bones or bones in poor condition should not be cleaned or washing to prevent it further deterioration.

The bone should be dried in a dry, pest-free room with good air access. Do not expose bones to direct heat or sunlight because bones may crack or shatter. Wet-sieved or floated bones only require drying.

When drying the bones, the drying-boxes should be labelled as well (using the bag or the inner record-note) to prevent the materials from becoming mixed.

8.5. Storage

After cleaning, the bags should be put into standardised, acid-free cardboard boxes. It is recommended organising the boxes in ascending order by the numbers of excavation units (especially in the case of long-term storage). To prevent further damage of the bones, the boxes should not be over-packed with bags. Boxes should be kept closed in order to prevent any contamination of the material.

The boxes should be labelled with the following data, with permanent and waterproof ink, using capital letters and Arabic numbers:

- The code/name of the project
- Recovery date
- Excavation unit numbers where the material came from
- Individual Record Number of the bags inside the box

The room for long-term storage should be pest-free and dry with good air access and avoid extreme temperature and air humidity fluctuations. Do not keep boxes directly on the floor. Boxes stored on the floor are more exposed to pests, fungi, rodents, and insects.

Flotation samples should be kept at room temperature, protected from heat or direct sunlight. Inadequate storage can affect the samples as algae, fungi, bacteria, pests can attack them. These factors can modify the pH of the soil that can lead to destruction of the archaeological material (metal, biological, bone remains, etc.). Any flotation or soil sample without documentation should be discarded.

If any material is given out for research, analysis, assessment, etc. it must be documented (material, date, reason, responsible person). The storage and documentation should be clear and systematic in order to make the material available and easily researchable for any following researcher.

8.6. Digital Archiving

All bags, boxes and samples should be registered within the digital database of the excavation. Archaeological context information should be connected with the materials in the digital database. It is important to have digital back up for documentation for situations when digital data recovery is necessary.

8.7. Discarding

Because no systematic sampling and collection of bioarchaeological data was applied on excavations at the site and in its surrounding area, all material should be kept for long-term storage. Discarding policies do not apply. In any case of discard, specialists should be asked in advance for their advice and recommendations. Discarding must be fully documented (material, date, reason, responsible person).

8.8. Assessment

To follow the general Hungarian protocols and to make the faunal data comparable, it is recommended to use the Microsoft Access based zooarchaeological database management software, CSONTÁSZ_2.2_RC (or its updated versions) developed by Péter Csippán for the assessment of faunal remains. Identification and measurements should be based on generally used methods and techniques in Hungary. For this reason, the recommended measurement guidelines can be found in the following works:

von den Driesch, Angela. *A guide to the measurement of animal bones from Archaeological sites*. Cambridge, MA: Harvard University, 1976.

Duerst, Ulrich J. *Vergleichende Untersuchungsmethoden am Skelett bei Säugern*. Handbuch der biologischen Arbeitsmethoden. Berlin: Urban & Schwarzenberg, 1926.

Any bioarchaeological report, assessment, or publication should be available for the excavation team and archived in digital format. Reports should be also made available online.[133]

[133] The requirements for the zooarchaeological reposts are behind the focus of this thesis.

9. Conclusion

In my thesis I analysed and compared the different concept and approaches towards bioarchaeology in North-America, Europe, and Hungary. This comparison shows that there is not a completely unified approach in the field either in Europe or across the Atlantic in North America.

Unified terminology helps researchers in different field of study to understand and to effectively communicate with each other. The importance of communication between specialists in different fields cannot be stressed enough. For this purpose, I deliberately employ the original, holistic concept towards bioarchaeology, which in my view would contribute more to the field of archaeology.

One of the main aims of this thesis was to propose a new bioarchaeological protocol with a special focus on animal remains for the medieval archaeological site of Pomáz-Nagykovácsi-puszta (Hungary, Pest County). Therefore, I compared the existing Hungarian zooarchaeological protocols and related documents through qualitative analysis in order to critically illuminate the lack of unified approach, different focal points, and missing important issues (e.g. sampling, or microfaunal remains). Furthermore, I also compared the Hungarian protocols with the ICAZ protocol in order to see whether there are different approaches outside the country.

The analysis of the protocols also helped give me a broader understanding of the content and structure of these kinds of documents. Through the three selected case studies presented in the thesis I shed light on methods used in practice from the planning period of an excavation until their implementation in the field, and long-term storage and archiving issues.

Each of the case studies was designed to emphasise different sets of issues in bioarchaeology such as excavation strategy, sampling, storage, and discarding policies.

My research on Hungarian and international protocols, and best excavation practices helped me to develop a new set of principles and a new bioarchaeological protocol for the planned excavation site of Pomáz-Nagykovácsi-puszta.

With the hope of more broad-based implementation I will also translate the protocol into Hungarian and offer it for use at Pomáz-Nagykovácsi-puszta and for any other interested excavating archaeologists at various institutions in Hungary.

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