De Grossi Mazzorin, Jacopo – Minniti, Claudia

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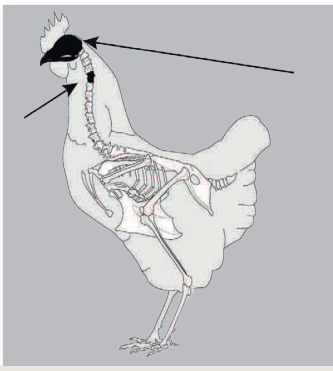

Sabine Deschler-Erb | Umberto Albarella
Silvia Valenzuela Lamas | Gabriele Rasbach

ROMAN ANIMALS IN RITUAL AND FUNERARY CONTEXTS

Proceedings of the 2nd Meeting of the Zooarchaeology of the Roman Period Working Group, Basel, 1st–4th February 2018

This volume includes a number of papers that were originally presented at the conference *Roman Animals in Ritual and Funerary Contexts*, which was held in Basel (Switzerland) from 1st–4th February 2018. The conference represented the second meeting of the International Council for Archaeozoology (ICAZ) Working Group on the *Zooarchaeology of the Roman Period*.

The articles present ritually deposited animal remains across a wide geographical range and incorporate both archaeological and zoological findings. The integration of these two strands of evidence is also one of the central concerns of the ICAZ Working Group, as in the past they have often been dealt with separately. However, it is precisely this interdisciplinary cooperation that opens up new perspectives on ritual practices in a wide variety of contexts. In this volume we see the enhancement of our understanding of ritual treatment of animals in central sanctuaries, in rural areas, at natural sites, and as part of building construction processes.

The case studies presented in this volume demonstrate how animal remains such as bones and eggshells provide information beyond diet, economy, and differences in social hierarchy. Their interdisciplinary investigation additionally enables insights into practices governed by cultural, religious, and ideological conditions.

The aim of the Zooarchaeology of the Roman Period Working Group (https://alexandriaarchive.org/icaz/workroman) is to represent a network of exchange and collaboration across borders and to enable the understanding of the interconnections between the research questions associated with animal remains from this important historical period.

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DEUTSCHES ARCHÄOLOGISCHES INSTITUT
Römisch-Germanische Kommission, Frankfurt a. M.

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Vorwort zur Reihe „Kolloquien zur Vor- und Frühgeschichte“

In Händen halten Sie, liebe Leserin und lieber Leser, den 26. Band der „Kolloquien zur Vor- und Frühgeschichte“, der Ihnen neu und doch vertraut vorkommen mag. Denn diese Reihe, die von der Römisch-Germanischen Kommission (RGK) und der Eurasien-Abteilung des Deutschen Archäologischen Instituts (DAI) gemeinsam herausgegeben wird, existiert seit 23 Jahren, seit im Jahr 1997 die Akten des Internationalen Perlensymposiums in Mannheim als Band 1 publiziert wurden. Neu ist aber, dass die RGK erstmals die Herausgabe eines Bandes im neuen Reihenformat des DAI betreut hat. Die Aufmachung der „Kolloquien zur Vor- und Frühgeschichte“ (KVF) entspricht nun der Aufmachung zahlreicher weiterer Publikationsreihen des DAI. Das neue Layout ist moderner, attraktiver und nutzerfreundlicher. Es ist nun für viele DAI-Publikationsreihen nutzbar und hat einerseits einen hohen Wiedererkennungswert, erlaubt andererseits individuelle Anpassungen und Nutzungen.

Auch der vorliegende Band ist, wie es seit ihren Anfängen prägend für die KVF ist, ein Beispiel international ausgerichteter, Forschungstraditionen und -regionen übergreifender Wissenschaft. Inhaltlich schließt dieser 26. Band an eine ganze Reihe von KVF-Sammelbänden mit interdisziplinärer bzw. fachübergreifender Ausrichtung an. Mit KVF 26 stehen diesmal interdisziplinäre Untersuchungen zu Mensch-Tier-Beziehungen in den verschiedenen regionalkulturellen Kontexten des Römischen Reiches im Mittelpunkt und insbesondere die Rolle von Tieren in Zusammenhang mit Bestattungen und anderen Ritualen.

Knochengewebe vermag sehr gut, viele verschiedene Spuren menschlichen Handelns zu konservieren, und diese Spuren können wir als Zeugnisse dieser Handlungen, aber auch der dahinterstehenden Überlegungen, Absichten und Traditionen verstehen. So erlauben Tierknochen, aber auch andere Überreste wie Eierschalen, die Verknüpfung zoologischer Methoden und Fragen mit jenen einer sozial- und kulturhistorisch orientierten Archäologie. Tierreste sind also in jedem Sinne *archäologische* Funde, die nicht nur zu Ernährungs- und Wirtschaftsfragen Auskunft geben können, auch nicht allein zu sozialhierarchisch begründeten Unterschieden bei Bestattungsbeigaben, sondern auch zu *per se* kulturhistorischen Fragen wie eben jenen nach kulturell, religiös bzw. weltanschaulich bestimmten Praktiken, nach Differenzen in ihrer Ausübung, nach ihren regional spezifischen Bedeutungen und nach ihren Veränderungen.

Damit liegt ein informativer und instruktiver 26. Band der KVF vor mit neuen Ansätzen, neuen Fragen und neuen Einsichten in einem neuen gestalterischen Gewand. Die Aufnahme der Reihe KVF in die einheitliche Publikationsgestaltung des DAI ermöglicht auch, diesen und weitere KVF-Bände in Zukunft in der *iDAI.world* – der digitalen Welt des DAI – unter *iDAI.publications/books* online zugänglich zu machen und zum Abruf im Open Access bereitzustellen. Zwar dient auch den interdisziplinär arbeitenden Altertumswissenschaften das gedruckt erscheinende Werk nach wie vor als Hauptmedium fachwissenschaftlichen Austauschs, doch stehen uns durch die digitale Vernetzung unterschiedlicher Daten- und Publikationsformate mittlerweile zahlreiche weitere Möglichkeiten der Veröffentlichung wissenschaftlicher Inhalte zur Verfügung. Das neue Publikationsformat ermöglicht die zukunftsweisende Verknüpfung von Print und digitalen Dokumentations- und Publikationsressourcen, z. B. durch das zeitgleiche Bereitstellen digitaler Supplemente.

Das Erscheinen von 26 Bänden in kurzen Abständen zeigt, dass die vor über 20 Jahren konzipierte Reihe erfolgreich war und ist, innovativ bleibt und in eine lebendige Zukunft blickt. Auch künftig werden Eurasien-Abteilung und RGK die Reihe „Kolloquien zur Vor- und Frühgeschichte“ im neuen Gewand und – wo sinnvoll und notwendig – als hybride Verknüpfung analoger und digitaler Wissensvermittlung fortführen. Und wie bisher werden wir in die KVF Beiträge von Tagungen und Symposien aufnehmen, an deren Vorbereitung und Durchführung wir personell bzw. organisatorisch beteiligt waren.

Zuletzt noch ein Dank an alle an der vorliegenden Publikation Beteiligten. Für die Möglichkeit im neuen Reihenformat des DAI publizieren zu können, danken wir ganz herzlichen den Kolleginnen und Kollegen der Redaktion der Zentrale. Die Bildbearbeitung der Beiträge lag in den Händen von Oliver Wagner. Johannes Gier war für das Lektorat der Beiträge verantwortlich. Lizzie Wright redigierte die englischen Texte, Hans-Ulrich Voß betreute die Drucklegung des Buches. Ihnen wie den Herausgeber*innen des Bandes danken wir sehr für die hervorragende Vorbereitung und Durchführung der Publikation.

Frankfurt am Main, den 12.11.2020

Eszter Bánffy
Erste Direktorin

Kerstin P. Hofmann
Zweite Direktorin

Alexander Gramsch
Redaktionsleiter

Preface to the series "Kolloquien zur Vor- und Frühgeschichte"

In your hands, dear reader, you hold the 26th volume of the series "Kolloquien zur Vor- und Frühgeschichte": It might seem to you different, but still familiar, because this series, concomitantly published by the Romano-Germanic Commission (RGK) and the Eurasia Department of the German Archaeological Institute (DAI), has been in existence for 23 years. The first volume, published in 1997, consisted of the proceedings of the "Internationales Perlensymposium" held in Mannheim. What is new is that the RGK has published a volume in the new DAI series format for the first time. The layout of "Kolloquien zur Vor- und Frühgeschichte" (KVF) now matches the layout of numerous other DAI publication series. This modern layout is more attractive and more user-friendly; the new format is mirrored across many DAI publication series. Not only does it have a distinctive design; it also enables individual adaptations and uses.

The present volume, as is characteristic of the KVF series from its beginnings, is an example of internationally oriented scholarship spanning diverse research traditions and research fields. In terms of content, this 26th volume continues a long tradition of conference proceedings with an interdisciplinary or cross-disciplinary orientation published within KVF. The focus of KVF 26 is on interdisciplinary studies of human-animal relationships in different regional-cultural contexts of the Roman Empire. In this, particular emphasis lies on the role of animals in burial and other ritual contexts.

Bone tissue excellently preserves many different traces of human actions. These traces can be interpreted as the evidence of these actions as well as of the underlying reflections, intentions, and traditions. Animal bones as well as other remains such as eggshells therefore make it possible to link zoological methods and issues with those related to socially and cultural-historically oriented archaeology. Animal remains are thus *archaeological* finds in every sense: They provide information not only about diet and economy, or about differences in grave goods based on social hierarchy. They touch on key cultural issues such as culturally, religiously or ideologically determined practices. Moreover, zooarchaeological analyses allow us to detect differences in these practices, to identify regionally specific meanings and the changes therein.

Thus, an informative and instructive 26th volume of the KVF series is available in a new design, including new approaches, new research questions, and new insights. In the future, through the incorporation of the KVF series into the common DAI publication design this and further volumes can be published online: on the *iDAI.world* platform – the digital world of the DAI – under *iDAI.publications/books* and in Open Access. Printed publications admittedly still serve as a main medium for subject-specific exchanges for interdisciplinary archaeological studies. The new publication format allows digital networking of various data and publication formats providing us with numerous additional possibilities for the publication of scientific content and enabling the future-oriented linking of print and digital documentation and publication resources, for example through the simultaneous provision of digital supplements.

The publication of 26 KVF volumes at short intervals shows that this series conceived over 20 years ago has been successful, remains innovative, and looks ahead to a lively future. From now on the Eurasia Department and the Romano-Germanic Commission will continue the series "Kolloquien zur Vor- und Frühgeschichte" in the new design and, where this seems reasonable and vital, in the form of a hybrid connection of analogue and digital knowledge. As in the past, in the KVF series we will continue incorporating proceedings of meetings and symposia in the preparation of which we are involved personally or organisationally.

Lastly we want to express our gratitude to all who participated in producing the present publication. We thank our colleagues from the editorial office at the Head Office of the German Archaeological Institute for the opportunity to publish in the new DAI series format. The digital imaging of the contributions was carried out by Oliver Wagner. Johannes Gier was responsible for the copyediting of the contributions. Lizzie Wright edited the English texts. Hans-Ulrich Voß was in charge of the editorial process. We are very grateful to all these people and to the editors of the volume for the outstanding preparation and realisation of this publication.

Translated by Karoline Mazurié de Keroualin.

Frankfurt am Main, 12 November 2020

Eszter Bánffy
Director

Kerstin P. Hofmann
Deputy Director

Alexander Gramsch
Head of the editorial office

Inhaltsverzeichnis

(Logo: Stefanie Deschler)

Preface

by *Sabine Deschler-Erb / Umberto Albarella / Silvia Valenzuela Lamas / Gabriele Rasbach*

This volume includes contributions that were originally presented at the conference *Roman Animals in Ritual and Funerary Contexts*, which was held in Basel 1st–4th February 2018 and organised by Sabine Deschler-Erb. The conference represented the second meeting of the International Council for Archaeozoology (ICAZ) Working Group on the *Zooarchaeology of the Roman Period*.

ICAZ Working Groups are largely informal and independent collectives of researchers engaged with a theme of common interest. Their association with ICAZ allows them to connect to a larger international community and benefit from a number of shared facilities, such as the ICAZ web page <https://www.alexandriaarchive.org/icaz/index (last access: 20.10.20)> and Newsletter <http://alexandriaarchive.org/icaz/publications-newsletter (last access: 20.10.20)>. They also enjoy the opportunity to share the ICAZ ethos of collaboration, mutual aid, and international solidarity.

The *Zooarchaeology of the Roman Period* ICAZ Working Group was originally proposed by Silvia Valenzuela Lamas and Umberto Albarella and approved by the ICAZ International Committee in 2014. The aspiration to create such a group emerged from the awareness that the Roman World was intensively connected. Nevertheless, much research on the use of animals in Roman or Romanised areas has been carried out at a localised level, often oblivious of parallel studies undertaken in other regions of Roman influence. It was clear that many of the investigated research themes – such as the use of animals in religious contexts, livestock trade, and husbandry improvements, to mention just a few – would benefit from greater integration and enhanced international synergies. This applied to the methodological approach, as well as the actual evidence from different areas of the Empire. With this objective in mind, the first meeting was organised in Sheffield (UK) 20th–22nd November 2014 by the two Working Group promoters and focused on *Husbandry in the Western Roman Empire: a zooarchaeological perspective*. The core objective of the meeting was to bring together researchers operating in different areas of the former Roman World and contiguous regions, which was successfully achieved. Some of the contributions to that conference were published in a monographic issue of the *European Journal of Archaeology* (Volume 20, Special Issue 3, August 2017).

The focus on the western Empire that characterised the first meeting led to the need to open up geographically for the second meeting and focus on a thematic investigation which would be of fully international relevance. Sabine Deschler-Erb proposed to organise the second meeting in Basel (Switzerland) and this, at the very core of Europe, proved to be a very successful location. She suggested a number of possible topics to the informal membership of the group and the theme of 'ritual' was chosen. This was another fruitful move as there was hardly any shortage of material to present, and the conference provided a whirlwind of case studies across different areas, whose connections and shared questions could clearly be identified. The objective of the second meeting to move beyond the focus on the Western Empire was fully achieved. The list of papers included in this volume clearly shows the great geographic range on display, with different contributions presenting research based in the south, north, east, and west of the Roman area. The modern countries featured in the book include Austria, Belgium, Britain, Egypt, France, Germany, Greece, Italy, Malta, the Netherlands, Romania, Serbia, Switzerland and Turkey.

The Basel conference and its proceedings should provide an ideal springboard for further success and interconnection of researchers investigating the use of animals in Roman times.

Last but not least, we would like to express our great gratitude to all of the institutions and people who made the Basel conference and these proceedings possible. We thank the University of Basel, especially the Integrative Prehistory and Archaeological Science, for hosting the conference, as well as for technical and administrative support; the Swiss National Foundation, the Provincial Roman Archaeology Working group of Switzerland, and the Vindonissa chair of the University of Basel for their financial support; the Römerstadt Augusta Raurica, the Kantonsarchäologie Aargau, and the Römerlager Vindonissa for their warm welcome and generous catering; the organisation team, Monika Mráz, David Roth, and Viviane Kolter-Furrer, whose help was essential before, during, and after the conference; all student volunteers, Florian Bachmann, Debora Brunner, Marina Casaulta,

Laura Caspers, Sarah Lo Russo, Hildegard Müller, and Benjamin Sichert, who worked with great commitment; and the Romano-Germanic Commission, Frankfurt, who accepted these proceedings for their series. We thank Hans-Ulrich Voß and Johannes Gier, who carried out an excellent editing job.

The next conference will take place in Dublin (Ireland) on 11th–13th March 2021 and will be organised by Fabienne Pigière on the topic of *Animals in Roman economy*. It will certainly provide new opportunities for cross-fertilisation, collaboration, and exchange of ideas.

Bird and other animal sacrifice in the *Ploutonion* of Hierapolis, Phrygia (Turkey): some results from two votive deposits

by *Jacopo De Grossi Mazzorin / Claudia Minniti*

Keywords

Hierapolis, Phrygia, *Ploutonion*, 1st–2nd centuries AD, sacrifice, bird and mammal remains, fish and reptiles

Schlüsselwörter

Hierapolis, Phrygien, *Ploutonion*, 1.–2. Jahrhundert n. Chr., Opfer, Vogel- und Säugetierreste, Fische und Reptilien

Mots-clés

Hiérapolis, Phrygie, *Ploutonion*, 1er–2e siècles ap. J.-C., sacrifice, restes d'oiseaux et de mammifères, poissons et reptiles

Introduction

Archaeological excavations carried out by the University of Salento (Lecce, Italy) at Hierapolis in classical Phrygia (south-western Anatolia, Turkey), brought to light the *Ploutonion* mentioned by ancient writers[1]. Since the 1st century BC this building became a famous pilgrimage site dedicated to the god Pluto, and was then considered a Gate to the Underworld. The core of the shrine was represented by a small theatre built on top of a cave from which water sprang along with carbon dioxide emissions, and where the animals were sacrificed by suffocation caused by the toxic fumes. Other rooms, used by the faithful as part of a ritual passage which included ablutions, libations and sacrifices in honour of the chthonic deities, were adjacent to the theatre. The archaeological site is fully consistent with descriptions made by ancient writers[2], who provide details of the sanctuary and its rites[3].

An important part of the rites was the sacrifice of bulls through asphyxia caused by the fumes, performed according to the rules of chthonian cults. However, the rites also included the sacrifice of birds that were thrown into the cave in order to verify the lethal effect of gases. The birds instantly died, while only the eunuch priests of the goddess Cybele were able to come out of the cave unscathed[4].

Inside the sanctuary, numerous votive deposits were discovered during the archaeological excavations, and animal remains always represented a large part of them. Animal bones were generally associated with stone al-

1 D'Andria 2013; D'Andria 2017; D'Andria 2018.
2 See Strabo, Geography, 13,4; 14.
3 D'Andria 2013; D'Andria 2017, 210; D'Andria 2018.
4 D'Andria 2017, 210; D'Andria 2018. Even today, poisonous gases cause the death of birds that get too close to the mouth of the cave (D'Andria 2017, 224).

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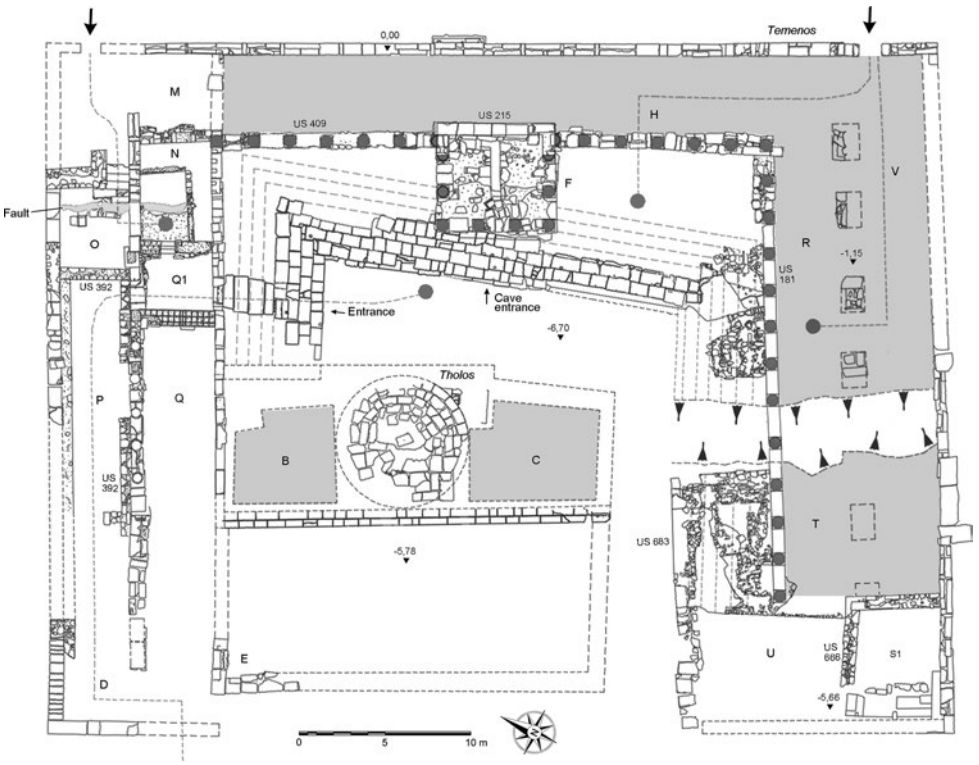


1 Map of the Ploutonion of Hierapolis.

tars with significant traces of burning activities, as well as to *unguentaria*, oil lamps (with signs of use), and libation cups which were found upturned with the rim pressed into the ground[5].

The study of the animal remains from the *Ploutonion* started in 2014 and is still in progress. In this paper we will discuss the preliminary results of the study of the animal remains from two votive deposits.

Material and methods

The animal remains from the *Ploutonion* of Hierapolis presented and discussed here come from two deposits (SU 562-253 and SU 711) excavated in Room Q1 of the sanctuary. The two samples include a large quantity of animal remains, mostly represented by birds of various species and sizes[6]. According to pottery and other votive materials, the animal remains from the two deposits are dated to the 1st and 2nd centuries AD; however, stratigraphical data clearly show that they were moved from their primary deposition and located in Room Q1 as 'repair offerings' at the end of the 3rd century/second half of the 4th century AD during building, renovation, and cleaning works at the sanctuary *(fig. 1)*.

The animal remains were very well preserved. During excavation, a large quantity of remains from small animals was immediately noticed *(fig. 2)*; therefore, for a better recovery of the material, a programme of fine sieving (5–10 mm) was undertaken for both deposits.

A preliminary analysis showed that in both deposits most of the remains belonged to birds. After having verified that all bird body parts were well represented, we decided to record only humeri and femurs, in order to overcome the large amount of bird remains. For the other animal classes that were identified, we recorded all remains, although we used only humeri and femurs in counting analyses when comparing mammal and bird species frequencies.

5 D'Andria 2017, 213–214.

6 D'Andria 2018, 128–129.

All animal remains were identified according to Schmid for mammals[7] and to Tomek / Bocheński for birds[8]. The scientific nomenclature of domestic animals follows Gentry et al.[9]. The sheep/goat distinction was attempted using the criteria described by Boessneck et al.[10], Kratochvil[11] and Zeder / Lapham[12] for post-cranial elements, and by Payne[13], Halstead / Collins[14] and Zeder / Pilaar for teeth[15]. The state of epiphyseal fusion of mammal long bones was recorded as fused or unfused (epiphysis, metaphysis or both). The analysis of fusion data relied on Silver for cattle[16], Bull / Rackham[17] for caprines and Bull / Payne for pigs[18]. Tooth wear stages were recorded following Bull / Payne[19] for pig and Payne for sheep/goat[20]. The age stage of bird remains was estimated on the basis of the occurrence of porosity on the articular ends of long bones, which allowed the identification of immature individuals. Measurements of bones were taken following von den Driesch for mammals and birds[21]; additional bird measurements were taken following Tomek / Bocheński[22].

Results

In both deposits bird remains are predominant, representing 95 % and 98.5 % of the remains respectively. Only ca. 4.5 % and 1.5 % of the remains from the two deposits belong to mammals. Also represented in one of the deposits (SU 711), although with very few remains, are fish and reptiles *(tab. 1)*.

	SU 711			SU 562-253		
	NISP	**%**	**MNI**	**NISP**	**%**	**MNI**
Cattle – *Bos taurus* L.	5	0.2		2	0.6	
Sheep or goat – *Ovis* vel *Capra*	31	1.5		2	0.6	
Sheep – *Ovis aries* L.	1	0.05				
Pig – *Sus domesticus* Erx.	52	2.5		1	0.3	
Dog – *Canis familiaris* L.	4	0.2				
Hare – *Lepus* sp.	2	0.1				
Birds nd – *Aves* nd	317	15.0		102	31.9	
Domestic fowl – *Gallus gallus* L.	641	30.4	153	121	37.8	27
Rock dove – *Columba livia* L.	1051	49.8	197	92	28.8	22
Turtledove – *Streptopelia turtur* L.	2	0.1	2			
Fish nd – *Pisces* nd	3	0.1				
Reptile nd – *Reptilia* nd	2	0.1				
Total	2111			320		

Tab. 1 Numbers of animal remains (NISP), with relative percentages and minimum number of individuals (MNI), for each taxon in the two deposits. For mammals and birds only humeri and femurs have been included. See *table 7* for the MNIs of mammal taxa.

Among birds, rock dove (*Columba livia*)[23] and domestic fowl (*Gallus gallus*) remains are the most common, followed by the remains of other birds of different sizes that have not yet been identified to species; preliminary observations suggest these latter certainly belonging to several species. Among these, two bones (from SU 711) can be safely attributed to the turtledove (*Streptopelia turtur*).

7 Schmid 1972.
8 Tomek / Bocheński 2009.
9 Gentry et al. 2004.
10 Boessneck et al. 1964
11 Kratochvil 1969.
12 Zeder / Lapham 2010.
13 Payne 1985.
14 Halstead / Collins 2002.
15 Zeder / Pilaar 2010.
16 Silver 1969.
17 Bull / Rackham 1982.
18 Bull / Payne 1982.
19 Bull / Payne 1982.
20 Payne 1973.
21 von den Driesch 1976.
22 Tomek / Bocheński 2009.
23 *C. livia* was separated from *C. oenas* and *C. palumbus* using the criteria described in Tomek / Bocheński 2009.

2 The authors engaged in the study of the bird remains from the deposits SU 711 and SU 562-253 found in room Q1 of the Ploutonion.

3 Fragments of eggshells from the deposit SU 562-253.

Comparing the relative frequencies of bird species by deposit, some differences can be observed *(tab. 2)*. Rock dove remains prevail on chicken remains in deposit SU 711, whereas the proportion of these two species is reversed in deposit SU 562-253. The NISP of other unidentified birds is higher in SU 562-253 than in SU 711.

	SU 711		SU 562-253	
	NISP	%	NISP	%
Domestic fowl	641	31.9	121	38.4
Rock dove	1051	52.3	92	29.2
Turtledove	2	0.1		
Bird nd	317	15.8	102	32.4
Total	2011		315	

Tab. 2 Numbers of bird remains (NISP) and relative percentages for each taxon in the two deposits. Only humeri and femurs have been included.

	SU 711		SU 562-253	
	NISP	%	NISP	%
Mature	494	77.1	64	55.2
Immature	147	22.9	52	44.8
	641		116	

Tab. 3 Numbers of mature and immature domestic fowl bones (NISP) and relative percentages in the two deposits. Only humeri and femurs have been included.

	SU 711		SU 562-253	
	NISP	%	NISP	%
Mature	1051	100	89	98.9
Immature	–	–	1	1.1
	1051		90	

Tab. 4 Numbers of mature and immature rock dove bones (NISP) and relative percentages in the two deposits. Only humeri and femurs have been included.

In SU 711 and SU 562-253, 77 % and 55 % of chicken remains respectively were from mature individuals, with immature specimens accounting for 23 % and 45 % of the bones *(tab. 3)*. Rock dove remains belonged to mature individuals in both deposits, except for an immature specimen from SU 562-253 documented by a humerus with porous epiphyses *(tab. 4)*.

All chicken femurs were drilled using a grinding stone bit, in order to assess the presence of medullary bone in the marrow cavity. Its presence allows the assignment of some remains to laying hens[24]. The occurrence of medullary bone in more than half of the femurs from both deposits indicates that numerous hens were 'in lay' when they were sacrificed *(tab. 5)*. The presence of eggshell fragments was also observed in SU 562-253 *(fig. 3)*.

24 Driver 1982.

	SU 711		SU 562-253	
	NISP	%	NISP	%
without medullary bone	80	36.4	15	44.1
with medullary bone	140	63.6	19	55.9
	220	100	34	100

Tab. 5 Numbers of domestic fowl femurs (NISP) and relative percentages based on the presence of medullary bone in the two deposits.

All skeletal elements of rock dove and chicken were identified in both deposits, suggesting that no selection of body parts occurred. No butchery marks were noticed. These data, along with the absence of cuts associated with slaughtering, suggest that the birds were not dismembered after they had been killed by suffocation.

Burning marks are instead common, affecting half of bird remains (ca. 52 %) from deposit SU 711, and a smaller proportion (ca. 6 %) of remains from deposit SU 562-253. Therefore, the evidence from burning marks highlights yet another difference between the two deposits.

Among mammals, cattle (*Bos taurus*), sheep (*Ovis aries*), goats (*Capra hircus*), and pigs (*Sus domesticus*) are the most represented in both deposits *6 and 7).*

	SU 711	SU 562-253
	NISP	NISP
Cattle	22	125
Sheep or goat	222	19
Sheep	30	2
Goat	1	
Pig	298	15
Dog	36	4
Hare	8	
Total	617	165

Tab. 6 Number of mammal remains (NISP) for each taxon in the two deposits. All anatomical elements included.

	SU 711	SU 562-253
	MNI	MNI
Cattle	3 (1A + 1SA + 1J)	5 (3A + 1SA + 1N)
Sheep or goat	15 (6A + 4SA + 4J + 1F vel N)	3 (1SA + 2N)
Pig	15 (2A + 1 SA + 11F vel N)	2 (1SA + 1N)
Dog	2 (2A)	1 (1A)
Hare	1 (1A)	–

Tab. 7 Minimum number of individuals (MNI) for each taxon in the two deposits, according to all anatomical elements (A = adult; SA = subadult; J = juvenile; N = neonatal; F = foetus).

4 Cattle first phalanges to which the proximal plantar side was cut.

5 Distal part of a cattle first phalanx with clear cut marks.

Only 0.6 % of the mammal remains from SU 562-253 were burnt, while ca. 46 % of those from SU 711 presented burning marks.

Cattle are present with only few remains in one deposit (SU 711), while they are better represented in the other (SU 562-253). Body part distribution analyses show a predominance of elements from the lower limbs in SU 562-253 *(tab. 8).* Cut marks have been recorded on several phalanges, being often located on the proximal part of the plantar surface of first and second phalanges *(figs 4–5).* Mortality data show that cattle remains belonged mostly to animals culled between 18 and 36 months of age; however, several individuals were sacrificed before reaching 18 months of age, while no animals older than 36 months were recorded *(tab. 9).*

	Cattle		Sheep and goat		Pig	
	SU 711	SU 562-253	SU 711	SU 562-253	SU 711	SU 562-253
	NISP	NISP	NISP	NISP	NISP	NISP
cranium	1	–	6	1	12	1
maxilla	–	–	–	–	5	–
upper teeth	–	3	2	1	5	–
mandible	–	1	10 (1O)	4 (2O)	5	2
lower teeth	2	9	5	2	14	2
teeth nd	–	–	–	–	4	–
hyoid bone	–	3	–	–	–	–
atlas	4	–	2	–	10	–
axis	2	–	4	–	–	–
scapula	–	1	6	6	12	1
humerus	2	1	22	1	27	–
radius	2	3	14 (2O)	–	23	1
ulna	1	1	6	–	10	–
carpal	1	23	17	–	4	–
metacarpal	–	9	8	–	4	2
pelvis	2	1	7	1	17	–
femur	3	1	10 (1C)	1	25	1
patella	–	2	1	–	2	–
tibia	–	4	8 (1O)	–	26	2
malleolus	–	1	1	–	–	–
tarsal	–	8	6	–	1	–
astragalus	–	2	15 (2O)	–	5	–
calcaneum	1	5	9 (2O)	–	8	2
metatarsal	–	–	12	2	1	–
metapodial	–	1	12 (6O)	1	28	–
sesamoid	1	–	–	–	–	–
phalanx 1st	–	30	37 (3O, 1C)	–	32	–
phalanx 2nd	–	11	20	1	16	1
phalanx 3rd	–	5	13 (12O)	–	2	–
Total	22	125	253	21	298	15

Tab. 8 Body parts of cattle, sheep/goat, and pigs by number of fragments (NISP) in the two deposits (O = *Ovis aries*, sheep; C = *Capra hircus*, goat). All identified fragments have been included.

		SU 711		SU 562-253	
	age	U	F	U	F
scapula d.	7–10 months	–	–	1	0
pelvis a.	7–10 months	0	1	–	–
humerus d.	12–18 months	1	0	–	–
radius p.	12–18 months	0	1	–	–
phalanx 1st p.	18 months	–	–	1	18
phalanx 2nd p.	18 months	–	–	1	8
metacarpal d.	24–30 months	–	–	1	6
tibia d.	24–30 months	–	–	1	3
metapodial d.	30–36 months	–	–	1	0
femur p.	42 months	2	0	–	–
humerus p.	42–48 months	1	0	1	0
radius d.	42–48 months	–	–	2	0
ulna p.	42–48 months	1	0	–	–

Tab. 9 Occurrence of unfused (U) and fused (F) bones of cattle. Unfused epiphyses have been included.

Differently from cattle, both caprine and pig remains are well represented, especially in deposit SU 711; most caprine and pig anatomical elements were identified, suggesting that no body parts were selected *(tab. 8)*.

Caprine remains, with sheep prevailing on goat, mostly belonged to juvenile and sub-adult individuals *(tab. 10)*. Only 3 % of the remains refer to adults.

		SU 711		SU 562-253	
	age	**U**	**F**	**U**	**F**
humerus d.	-12 months	8	10	–	–
radius p.	-12 months	1	4	–	–
pelvis a.	-12 months	5	1	0	1
scapula d.	12 months	6	0	3	1
phalanx 1st p.	14–35 months	30	4	–	–
phalanx 2nd p.	14–35 months	20	0	1	0
tibia d.	35 months	4	1	–	–
femur p.	35 months	2	1	–	–
femur d.	48 months	7	0	1	0
metacarpal d.	48 months	1	0	–	–
metatarsal d.	48 months	6	0	–	–
metapodial d.	48 months	12	0	2	0
humerus p.	48–60 months	6	0	1	0
radius d.	48–60 months	9	0	–	–
ulna p.	48–60 months	6	0	–	–
calcaneum p.	48–60 months	8	0	–	–

Tab. 10 Occurrence of unfused (U) and fused (F) bones of sheep/goat. Unfused epiphyses have been included.

Instead, all pig remains were from young individuals *(tab. 11)*. In particular, 70 % of the remains belonged to neonatal animals or foetuses. We tried to identify their age at death according to Gjesdal[25] and Wenham et al.[26], who established a correlation between the diaphyseal length of long bones and the age of foetal development on the basis of both radiographs and dissected animals using over 500 Norwegian Landrace and Large White pigs. These measurements allowed calculating different linear regression equations. The regression formulas estimated by Gjesdal[27] and Wenham et al.[28], also reported in Prummel[29], were then applied to 27 specimens from our samples *(tab. 12)*.

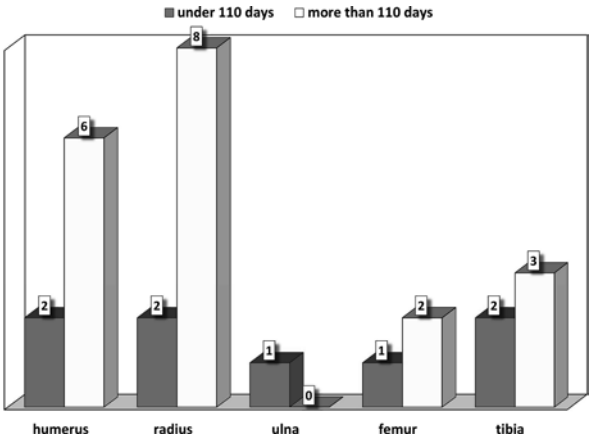
25 Gjesdal 1972.
26 Wenham et al. 1969; Wenham et al. 1973.
27 Gjesdal 1972.
28 Wenham et al. 1969; Wenham et al. 1973.
29 Prummel 1989.

		SU 711		SU 562-253	
	age	**U**	**F**	**U**	**F**
scapula a.	7–11 months	11	0	1	0
pelvis a.	7–11 months	14	0	–	–
humerus d.	+11 months	22	0	–	–
radius p.	+11 months	20	0	1	0
phalanx 2 p.	12–18 months	16	0	1	0
tibia d.	19–23 months	16	0	–	–
phalanx 1 p.	19–23 months	32	0	–	–
metacarpal d.	+23 months	3	0	1	0
metatarsal d.	+23 months	1	0	–	–
metapodial d.	+23 months	28	0	–	–
femur p.	31–35 months	20	0	–	–
humerus p.	+35 months	3	0	–	–
radius d.	+35 months	15	0	–	–
ulna p.	+35 months	8	0	–	–
ulna d.	+35 months	1	0	–	–
femur d.	+35 months	7	0	–	–
tibia p.	+35 months	10	0	–	–
calcaneum p.	+35 months	8	0	2	0

Tab. 11 Occurrence of unfused (U) and fused (F) bones of pigs. Unfused epiphyses have been included.

			Days from conception	
Anatomical element	**GLd**	**Burning**	**According to Gjesdal (1972)**	**According to Wenham et al. (1969; 1973)**
humerus	32.1	*	96	95
humerus	34.4	*	99	99
humerus	43.1	*	>114	>119
humerus	43.1	*	>114	>119
humerus	44.8	*	>114	>119
humerus	59.8		>114	>119
humerus	73.3	*	>114	>119
humerus	46.3		>114	>119
radius	23.1	*	97	95
radius	23.4	*	97	95
radius	28.5	*	110	114
radius	34.1	*	>123	>125
radius	37.5	*	>123	>125
radius	38.1	*	>123	>125
radius	38.3	*	>123	>125
radius	39		>123	>125
radius	39.6	*	>123	>125
radius	47.3		>123	>125
ulna	30.5	*		96
femur	35.4	*	105	104
femur	47.4	*	>120	>126
femur	43.5	*	120	126
tibia	29.9		96	95
tibia	35.1		105	108
tibia	48.4	*	>120	>125
tibia	48.8		>120	>125
tibia	55.9		>120	>125

Tab. 12 Age estimations from the day of conception based on the greatest length of diaphysis (GLd).



6 Age at death of pig remains from the day of conception, according to the gestation period (110 days) and to the greatest length of diaphysis (GLd).

Table 12 reports the greatest lengths of diaphyses (GLd) and the estimated ages from the day of conception, according to the two methods. The results show that ca. 78 % of remains belonged to born individuals, who had reached at least 110 days of age from conception corresponding to the end of the gestation period of pigs *(fig. 6)*. Indeed, on average it takes a sow three months, three weeks and three days to complete its pregnancy. A certain number of bones from our samples may belong to foetuses. However, it must be taken into account that most of these elements are burnt; combustion involves a minimal reduction in size, and this could have affected some measurements. As a consequence, it is possible that the burnt bones providing an age estimation of below 110 days actually belonged to neonates. Only two tibiae are not burnt and refer to individuals younger than 110 days from conception, providing an age at death of 95 and 108 days. The first of these can more safely be identified as a foetus, suggesting the sacrifice of a pregnant sow. Although the remains of fully mature pigs were not found *(tab. 11)*, we must consider that today the sexual maturity of sows occurs fairly early, at around 6–7 months of age; therefore, the absence of osteological remains of sexually mature individuals does not rule out our hypothesis.

Other mammal remains include few bones (NISP 8) of hare and some bones and teeth (NISP 36) of two dogs. The majority of dog remains refer to an adult male with a withers height of ca. 28 cm. It had very short but slightly twisted legs (brachymelic), as well as a pathology on both hind limbs consisting in the fusion of the fibula with the tibia *(fig. 7)*.

Fish are represented by two vertebrae and the pharyngeal teeth of a cyprinid (Cyprinidae). Two snake vertebrae were also recovered from one deposit (SU 711).

Conclusion

The nature of the animal assemblages from the two votive deposits excavated in the *Ploutonion* of Hierapolis is consistent with the descriptions contained in ancient sources of rites held at the sanctuary. Two types of rites were carried out: the first aimed to demonstrate the destructive power of Pluto; the other one consisted in the sacrifice of victims in honour of Pluto.

To the first rite refers the majority of bird remains; among them, the domestic fowl and the rock dove are well represented. Their discovery is perfectly consistent with the text of Strabo[30], who himself threw birds inside the cave of the *Ploutonion* and saw them suffocating with the fumes.

Almost complete rock dove and chicken skeletons were identified in both deposits; this means that no further carcass processing took place. The large quantity of bird remains suggest that, most probably, birds were given or sold to visitors outside the sanctuary by the priests, in order to allow people to personally observe the destructive power of Pluto[31].

No preference for birds of a certain age was noticed: mostly adult remains were recovered from one deposit, but an equal proportion of mature and immature bones characterises the other deposit. The identification of medullary bone in several domestic fowl bones indicates that a fair number of hens were in lay at the time of sacrifice.

Cattle, caprine, and pig remains on the other hand, may represent the sacrifice of victims in honour of deities. Pigs and caprines prevail in one deposit, while cattle are predominant in the other. The analysis of the distribution of cattle body parts for SU 562-253 shows a prevalence of bones from the extremities. Cattle were mainly sacrificed when between 1.5 years and three years of age.

30 Strabo, Geography, 13,4; 14.

31 Zwingmann 2012.

7 Remains of a dog with brachymelic legs and pathology on both hind limbs, consisting in the fusion of the fibula with the tibia; 1) left upper P4; 2) left upper M1; 3) left upper M2; 4) left humerus; 5) left radius; 6) left ulna; 7) right femur; 8) left femur; 9) right tibia; 10) left tibia; 11) left second metacarpal; 12) left fourth metacarpal; 13) left fifth metacarpal; 14) right pelvis; 15) left pelvis; 16) right calcaneum; 17) right astragalus; 18) left astragalus; 19) right fifth metatarsal; 20) left third metatarsal; 21) cuboid bone; 22) baculum; 23) first phalanges; 24) second phalanges.

Caprines, mostly sheep, were mainly sacrificed at young ages. Pigs were always culled at a very young age: a large part of their remains belonged to neonatal individuals; a couple of specimens probably refer to foetuses, possibly suggesting the sacrifice of pregnant sows.

The presence of other animal taxa, such as dog, fish, and snake in the votive deposits suggests that they were also used in the rites. In classical mythology, dogs were often linked with the underworld[32]. Snakes were also considered chthonic. Pluto is often represented together with snakes, as shown by the statue of Pluto and Cerberus, the mythological three-headed dog that guarded the "Kingdom of the Dead", found in fragments in the sanctuary of Hierapolis: two snakes were probably located on the sides of the throne on which Pluto was sitting[33].

Even fish could be connected with chthonic deities, although ancient writers report that the cult of Demeter and Kore only occasionally implied the consumption of fish[34]. However, the discovery of a few remains suggests that occasionally fish was used in the rites.

The chthonic character of fish is widely acknowledged in the 4th century AD by the emperor Julian the Apostate[35], who wrote that fish, swimming in deep waters, was even more chthonic than the seeds. The fish species black-tail (ancient Greek common name: *melanouros*), common pandora (*erythrinos*), and red mullet were particularly sacred to chthonic deities, perhaps due to their name itself (connected with death and blood); on the other hand, the fish *mainis* (identifiable with the blotched picarel, *Spicara maena*?) was sacred to Hecate[36].

32 De Grossi Mazzorin / Minniti 2006.
33 D'Andria 2017, 213.
34 Theodoropoulou 2013.
35 Julian the Apostat, *Eis ten metera ton theon* – The mother of the gods 17.
36 Mylona 2013.

This study shows once again the important contribution of the analysis of animal remains to our understanding of ancient ritual practices. In the case of the *Ploutonion* of Hierapolis, the study of animal remains complements and elucidates the information derived from written sources; it also provides useful undocumented details (e. g. species frequencies, age, sex) on the animals that were sacrificed in the sanctuary. The differences we noticed between the two samples analysed here suggest that the study of a larger number of votive deposits is necessary to provide a better understanding of all aspects of the rites held at the sanctuary.

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Abstract

The sacrifice of animals was an important part of the rite at the *Ploutonion* of Hierapolis (Turkey); as reported by several ancient writers, it was carried out by suffocation caused by the toxic fumes that escaped, together with spring water, from a cave. Strabo clearly describes the sacrifice of bulls and the custom of throwing birds inside the cave: their immediate death was a proof of divine powers, while priests were not harmed by the gases. The archaeological excavations carried out by the University of Salento brought to light numerous votive deposits inside the sanctuary. The results of the study of animal remains from two such deposits are presented here; the material is dated to the 1st–2nd centuries AD, although stratigraphical analyses suggest it was redeposited in Room Q1 of the sanctuary in the 3rd–4th centuries AD. In both deposits the remains of birds are predominant; among mammals, caprine, pig, and cattle remains are the most represented; other mammal remains include few bones of hare and some bones and teeth of two dogs. Caprine, cattle and pig remains belong mainly to young animals. Among the birds, rock dove and domestic fowl are the most common species, followed by the remains of other birds of different sizes, not yet identified to species level. Most of the remains of domestic fowl and rock dove belong to mature individuals. The presence of medullary bone in more than half of the femurs recovered from both deposits indicates that numerous hens were hatching at the time of sacrifice. This is consistent with the discovery of eggshell fragments. Almost complete skeletons of domestic fowl and rock dove have been recorded, suggesting that their carcasses were not processed after suffocation. Furthermore, no evidence for slaughtering was found, while burning marks were very common. Some remains of fish and reptiles suggest that these animals also took part in the rite.

Zusammenfassung

Vogel- und andere Tieropfer im *Ploutonion* von Hierapolis, Phrygien (Türkei): einige Ergebnisse von zwei Votivdeponierungen

Das *Plutonion* von Hierapolis im kleinasiatischen Phrygien (nahe Pamukkale) hat seinen Mittelpunkt in einer Höhle, aus der giftige Dämpfe aufsteigen und eine Quelle entspringt. Strabo berichtet, dass, in ein Geviert vor der Höhle getrieben, selbst Stiere starben und Vögel tot zu Boden fielen, während Priester die Höhle unbeschadet betreten konnten. Der Tod der Tiere galt als Zeichen von Plutos göttlicher Kraft. Archäologische Ausgrabungen der Universität Salento im Heiligtum ergaben eine große Anzahl von Votivgruben. An dieser Stelle werden zwei Deponierungen vorgestellt, die neben Tierknochen auch andere Funde enthielten. Während das Fundmaterial in das 1.–2. Jahrhundert n. Chr. datiert wird, legen stratigraphische Untersuchungen nahe, dass die Gruben erst im 3./4. Jahrhundert angelegt worden sind. Möglicherweise handelt es sich in Raum Q1 um Redeponierungen. In beiden Gruben überwiegen Knochen von Vögeln, unter den Säugetieren sind Überreste von Ziegen, Schweinen und Rindern am häufigsten vertreten; von weiteren Säugetieren sind wenige Knochen von Hasen und einige Knochen und Zähne von zwei Hunden zu nennen. Die Überreste von Ziegen, Rindern und Schweinen stammen hauptsächlich von Jungtieren. Unter den Vögeln sind am häufigsten Knochen adulter Haushühner und Felsentauben vertreten, gefolgt von Vögeln unterschiedlicher Größe, die noch nicht auf Artniveau identifiziert werden konnten. Hinweise auf Mark in mehr als der Hälfte der Oberschenkelknochen der Hühner aus beiden Gruben deutet darauf hin, dass es sich um junge Legehennen handelte. Darauf weisen auch Eierschalen hin, die in beiden Gruben gefunden wurden. Die nahezu vollständige Erhaltung der Skelette zeigt, dass die Vogelkadaver nicht weiter zerlegt wurden. An keinem Knochen konnten Spuren einer Schlachtung nachgewiesen werden, während Brandspuren sehr häufig sind. Einige Überreste von Fischen und Reptilien deuten darauf hin, dass auch diese Tiere als Opfer dienten.

Résumé

Sacrifice d'oiseaux et d'autres animaux dans le *Ploutonion* de Hiérapolis, en Phrygie (Turquie) : quelques résultats de deux dépôts votifs

Le sacrifice d'animaux était un élément important du rite célébré au *Ploutonion* de Hiérapolis (Turquie). Ainsi que le rapportent quelques auteurs anciens, des fumées toxiques mêlées à de l'eau de source qui s'échappaient d'une cavité provoquaient la suffocation des victimes. Strabon décrit clairement le sacrifice de taureaux et la coutume de jeter des oiseaux dans la cavité. Leur mort immédiate démontrait la puissance des dieux, tandis que les prêtres n'étaient pas attaqués par les gaz. Les fouilles archéologiques menées par l'Université de Salento ont révélé de nombreux dépôts votifs à l'intérieur du sanctuaire. Nous présentons ici les résultats de l'étude des restes animaux de deux dépôts. Le matériel date des 1er/2e siècles ap. J.-C., bien que les observations stratigraphiques suggèrent un transfert dans la pièce Q1 du sanctuaire aux 3e/4e siècles ap. J.-C. Les oiseaux dominent dans les deux dépôts. Parmi les mammifères, ce sont les caprins, les porcs et les bovins qui dominent, auxquels s'ajoutent quelques os de lièvres et quelques os et dents appartenant à deux chiens. Les restes de caprins, bovins et porcs proviennent principalement de jeunes individus. Le pigeon biset et la poule domestique représentent les espèces les plus communes, suivis par les restes d'autres oiseaux de différentes tailles dont l'espèce n'est pas encore identifiée. La plupart des restes de poules domestiques et pigeons bisets proviennent d'individus adultes. La présence d'os médullaire dans plus de la moitié des fémurs collectés dans les deux dépôts indique que de nombreuses poules étaient en train de couver au moment du sacrifice. Ceci correspond bien à la découverte de fragments de coquilles d'œufs. On a identifié des squelettes presque entiers de poules domestiques et de pigeons bisets indiquant que les carcasses n'avaient pas été traitées après la suffocation. En outre, aucune trace d'abattage d'animaux n'a été constatée, alors que les traces de combustion étaient très fréquentes. Quelques restes de poissons et de reptiles témoignent de la prise en compte de ces animaux dans le rite.