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DIMITRA MYLONA

Animals in the sanctuary

Mammal and fish bones from Areas D and C at the Sanctuary of Poseidon at Kalaureia
With an appendix by Adam Boethius

Abstract

During the excavations at the Sanctuary of Poseidon at Kalaureia an extensive archaeo-environmental programme was implemented, resulting in the collection and analysis of a wide range of animal remains. This paper presents the mammal and fish remains in detail and offers interpretations which take into account the archaeology of the site, other types of finds, as well as the discourse on animals in cult. The material is examined in terms of chronological phases and of particular features within them in an attempt, common in all types of analysis within the Kalaureia Excavation Program, to link the material remains to human actions, placing emphasis on the materiality of cult. The degree of analysis and interpretation detail varies among different occupational phases of the sanctuary, because of the greatly uneven preservation and quantity of animal remains. In certain cases of disturbed deposits and poor preservation, such as the bones from the Archaic and Classical strata, the analysis is left open-ended and the interpretation is pending, in view of subsequent studies that will include contemporary material from other locations within the sanctuary. In other instances, however, where closed or well-defined deposits are available, detailed analysis of the zooarchaeological data was possible and meaningful.

Keywords: zooarchaeology of cult, mammal bones, fish bones, dining deposit, snakes, dog bones, Kalaureia

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Introduction

The mammal and fish remains presented here originate from a variety of contexts in Areas C and D in the Sanctuary of Poseidon at Kalaureia (Poros, Greece).[1] These are of varied character, some of them being closed or well-defined contexts, while others being archaeological sediments, which were accumulated over time and/or were shifted and disturbed in antiquity or even in more recent times. The mammal and fish remains are presented here, in accordance to the standard approach within the project, on several levels: the general chronological grouping (e.g. Early Iron Age, Archaic, etc.) are subdivided into smaller units, which bear an element of contemporaneity of the finds (e.g. bones from a pit, from a particular fill, from a horizon of use). The following analysis is detailed, with special emphasis on issues of taphonomy. The purpose of such an approach, which is in fact, one of the main pillars of The Kalaureia Excavation Program, is to use the bioarchaeological remains, here the bones, as vehicles for exploring the specific human activities that created the archaeological record and the temporality of human actions on the site.

The zooarchaeological analysis follows the methodological standards of the discipline with some modifications. Identifications of terrestrial animals are based on mammal reference specimens and a relative atlas.[2] The sheep/goat distinction was based on Joachim Boessneck[3] and Sebastian Payne.[4] The detailed recording was limited to the limb bones, pelvis, atlas, mandibles, maxillae, teeth, and horn cores. The non-identifiable bones have also been recorded albeit in a more generalized manner. The categories recorded for these elements are their placement on the animal body, i.e. skull, trunk (vertebrae and ribs), long bones as well as the size of the animal, i.e. medium (sheep, goat, pig, dog) and large (equids, cattle). Some indications on the age of slaughter were obtained based on dental eruption and wear[5]

[1] Description of contexts, relevant site plans, and references are to be found in Penttinen & Mylona 2019.

[2] Schmid 1972.
[3] Boessneck 1969.
[4] Payne 1985.
[5] Payne 1973 for ovicaprids; Grant 1975 for bovines; Bull & Payne 1982 for pigs.

Editorial note

The section on the bioarchaeological remains from the Sanctuary of Poseidon at Kalaureia, published in the *OpAthRom* 12, includes seven articles: Penttinen & Mylona 2019; this contribution by Dimitra Mylona; Serjeantson 2019; Lymberakis & Iliopoulos 2019; Syrides 2019; Ntinou 2019; Sarpaki 2019. Summary of chronological phases (presented in Penttinen & Mylona 2019):

Abbreviation	Phase	Chronology	Area	Comment
EIA I	Early Iron Age	*c.* 750 BC	D	Fills of Features 07, 08, and 09 (three pits). Fill underneath Early Iron Age building.
EIA II	Early Iron Age	*c.* 750–700 BC	D	Floor accumulation in Early Iron Age building.
A I	Archaic	7th century BC	D	–
A II	Archaic–Hellenistic	6th century–Hellenistic	C	Construction of Wall 24.
			D	Remains from outdoor activities. Feature 05 (supposed altar).
A III	Archaic	*c.* 500 BC	C	–
			D	Construction of Stoa D and Features 03 and 04 (interconnected cisterns). Feature 10 (kiln).
A IV	Archaic	after *c.* 500 BC	D	Life span of buildings constructed during A III.
C I	Late Classical/Early Hellenistic	*c.* 325 BC	C	Construction of Building C.
			D	Construction of back part of Building D, including Feature 06 (staircase), Feature 01, and Feature 02 (unknown, altar?).
C II	Late Classical/Early Hellenistic	after *c.* 325 BC	D	Finds in the dirt floors of Building D.
H I	Hellenistic	*c.* 165 BC	D	"Dining deposit" west of Building D.
H II	Late Hellenistic/Early Roman	*c.* 50 BC–*c.* AD 100	D	Fill of Feature 03 (cistern). Finds from trench against Wall 11, which exposed Wall 33.

Other abbreviations used: DS = Dry sieving; HC = Hand collection; LG = Large size (for fish > 30 cm length); MD = Medium size (for fish 15–30 cm length); MNI = Minimum number of individuals; NISP = Number of identifiable specimens; SM = Small size (for fish <15 cm length); WF = Water flotation; WS = Wet sieving.

and on epiphyseal fusion data.[6] Quantification was based on NISP and in certain cases on MNI. Fish remains were recorded following the protocol set by Alwyn Wheeler and Andrew Jones.[7] In this paper the animal remains are presented in detail, and inferences on the significance of the observed features are discussed. Wider contextualizations however, are not attempted here in all cases, but only in the best-preserved and/or closed deposits. An overview of the stratigraphic, chronological, and spatial relations of the various contexts which are discussed in this paper is presented by Penttinen and Mylona in this volume.[8] Observations on these in relation to animal remains within the text are to be referred to this synopsis in addition to the original excavations' reports.

Area D. The Early Iron Age mammal and fish bones

The Early Iron Age strata in Area D (*Fig. 1*) produced a small but interesting bone assemblage. The animal bones originate from two types of deposits: from closed pits (Features 07, 08, and 09) and from a floor and floor fill associated with Wall 09.[9] This material will be described by feature, followed by a discussion of its general characteristics. An attempt will be made to place this assemblage in its temporal and geographical context.

FEATURE 09 (EIA I, *C.* 750 BC)

The animal bones recovered from this pit were collected by hand and by water flotation of two soil samples (WF68, WF72) amounting to a total of 22 litres. The deposit included three types of bones: bones of large animals, of which only the cattle can be securely identified, the remains of medium-size mam-

[6] Silver 1969.
[7] Wheeler & Jones 1989, 130–135.
[8] Penttinen & Mylona 2019.
[9] Wells *et al.* 2006–2007, 14, 20–49; Penttinen & Mylona 2019.

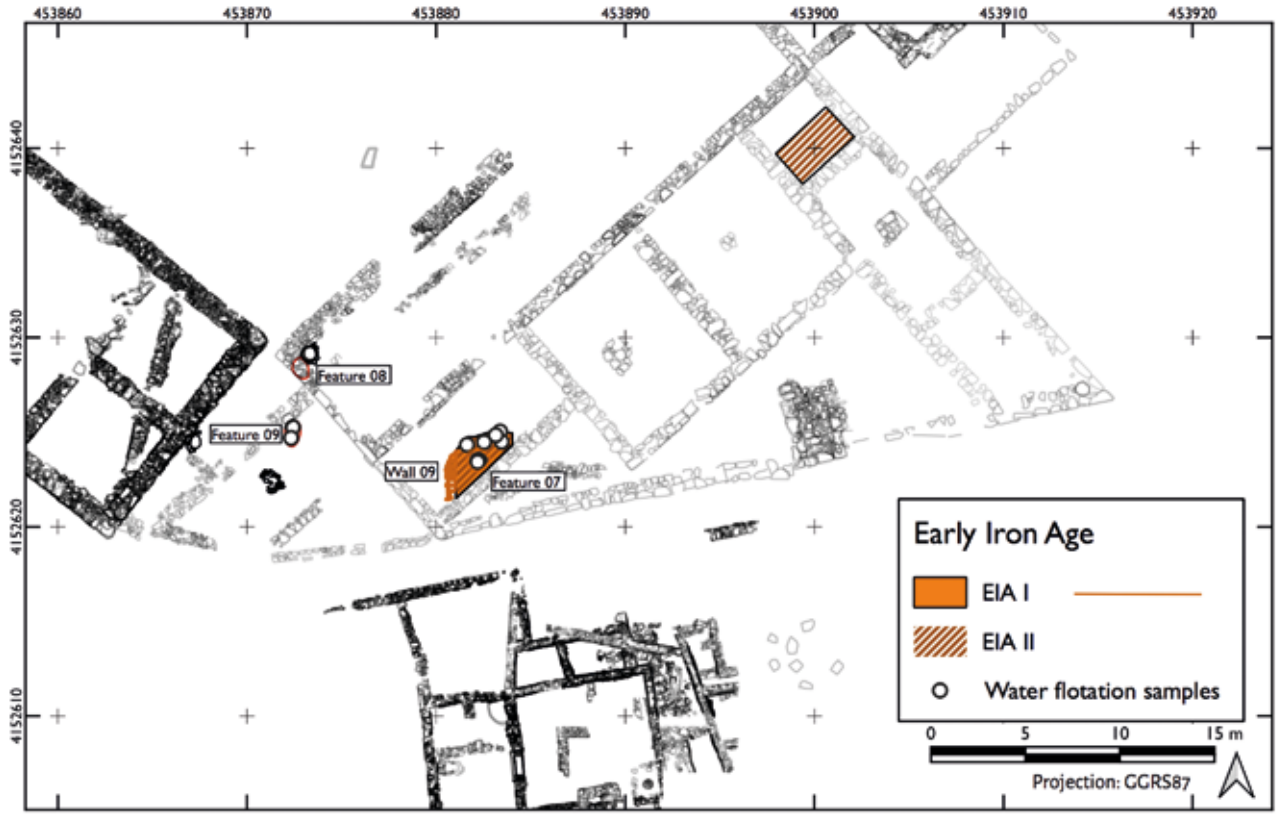

Fig. 1. Plan of Area D which shows the Early Iron Age excavated deposits and features discussed in the text and the positions of water-floated soil samples. By R. Rönnlund.

mals, none of which can be attributed to species or even genus, and the remains of marine animals, mostly fish (*Table 1*).

The two identified cattle bones as well as the seven non-identifiable bone fragments, which probably also belong to cattle, all share a common characteristic: they are extremely eroded. The remains of medium-size mammal(s) by contrast are much better preserved, with no obvious traces of erosion. None of the above are burned. The only burning is observed on three of the 150 indeterminate tiny bone fragments.

The fish remains are also very well preserved. They consist in one caudal vertebra of an indeterminate small fish (<15 cm in length), an otolith of a damsel fish (*Chromis chromis*), and 18 non-identifiable fish bones, which belong mostly to small fish (< 15 cm) but also to at least one medium-size fish (15–30 cm in length). These are both cranial and post-cranial elements. Almost half of the non-identifiable fish bones are burned brown/black, a rate of burning much higher than that observed for the mammal remains.

The deposit from Feature 09 also produced two sea-urchin teeth, but not a single spine fragment, normally the most conspicuous part of the sea-urchin to survive in coastal archaeological deposits. The sea-urchin teeth are probably intrusive, not related to the processes that led to the filling of this pit.

Table 1. Area D, EIA I. Feature 09: Taxonomic and anatomical representation.

	Cattle	Medium-size mammal	Indeterminate bone	Fish	Sea-urchin
Radius	1	-	-	-	-
Metacarpal	1	-	-	-	-
1st phalanx	-	1	-	-	-
Vertebra	-	-	-	1	-
Teeth	-	-	-	-	2
Otolith				1	
Non-identifiable	7	12	150	18	-
Total	**9**	**13**	**150**	**20**	**2**

It is interesting that intense erosion has only affected the bones of the large-size mammals, while burning has affected the fish bones most heavily. The medium-size mammals have remained unaffected by both these factors. This probably in-

Table 2. Area D, EIA II. Floor level of Wall 09: Taxonomic and anatomical representation.

	Cattle	Pig	Sheep/goat	Non-identifiable mammal	Small mammal	Fish
Tibia	1	-	2	-	-	-
Metatarsal	-	-	1	-	-	-
Atlas	-	-	1	-	-	-
Maxillary tooth	-	3	2	-	-	-
Cranial fragment	-	-	-	-	-	1
Vertebra	-	-	-	-	-	9
Non-identifiable	-	-	-	182	3	9
Total	**1**	**3**	**6**	**182**	**3**	**19**

dicates a different origin/treatment of the three groups before deposition. Although it is not possible to determine the exact nature of these different processes, some hypotheses are discussed later.

FEATURE 07 (EIA I, *C.* 750 BC)

The contents of Feature 07 were collected both by hand picking and by water flotation of three soil samples (WF64, WF69, WF70), amounting to 55 litres of soil. In contrast to Feature 09, Feature 07 included a very restricted variety of animal taxa.

The only identifiable bone is one goat horn-core. Seven non-joining cranial fragments found along with it, probably form part of the same skull as the horn-core, and had been deposited in the pit together. The assemblage from Feature 07 also includes one indeterminate ovicaprid mandibular tooth and 18 non-identifiable fragments of medium-size mammals, which probably also belong to ovicaprids. These are all eroded, and two of them are slightly burned (brown). There are also 60 tiny bone fragments (<0.5 cm), four of which are burned black.

The bone assemblage in Feature 07 is characterized by its extreme fragmentation and, with the exception of the horn-core, its bad preservation. It is possible that the bones, other than the horn-core, had not been deliberately collected to be included in the pit but they ended up there along with the soil fill, already broken and worn.

FEATURE 08 (EIA I, *C.* 750 BC)

The animal remains from this feature were collected from the water flotation of the total soil content of the pit, which amounted to only 2 litres. This deposit includes only four bones: one tarsal bone (navicular cuboid), two non-identifiable bone splinters from a medium-size mammal, probably a sheep or goat, and one fish caudal vertebra of a small comber (Serranidae). The mammal bones are all eroded.

The bones found in this pit are very few, probably due to the extensive destruction of the pit during the construction of Feature 03 (the cistern) in the A III phase.[10] The small size of the sample does not permit any evaluation of its contents. It could be mentioned, however, that the combination of mammal and fish remains resembles that found in Feature 09.

FLOOR LEVEL OF WALL 09 (EIA II, *C.* 750–700 BC)

The bone assemblage from the floor level of Wall 09 consists of 215 animal bones and splinters, which were hand-picked during the excavation and also retrieved from two water-floated soil samples (WF30, WF31) amounting to 44 litres. The taxonomic representation, shown in *Table 2*, is restricted to cattle, pig, ovicaprids, fish, and small mammals. Most of the remains, both identifiable and non-identifiable, are very small in size and their surface is fairly worn. Exposure and trampling on a living floor may account for this condition.

The anatomical representation for each taxon is shown in *Table 2*. It is interesting that pig is only represented by teeth as opposed to ovicaprids which are represented by a wider range of anatomical elements. Among the identifiable bones from larger mammals, one ovicaprid tibia fragment bears a transverse cut mark close to the proximal breaking line. This mark probably attests to the action of dividing a long bone and its flesh into smaller pieces. No burning traces are evident among the identifiable bones. Of interest is the presence of an ovicaprid milk incisor, from a newborn animal. The 182 non-identifiable mammal bone fragments are mostly long bone splinters. One third of them appear to be slightly eroded and seven of the bones are intensely burned (white).

The fish appear to be the most numerous animal group in this context (with the exception of sea-shells). The fish bone assemblage consists of seven vertebrae of sea breams (Sparidae), one of them probably belonging to a striped bream (*Lithognanthus mormyris*), one vertebra of a conger eel or moray (Congridae/Murraenidae), one vomer of a comber (*Serranus scriba*), one unidentified vertebra of a small fish, two scales and seven non-identifiable fish bones. The non-identifiable fish bones are all spines of small/medium-size fish, with the exception of one bone of a large-size fish (30–50 cm in length). This last one is burned brown. The fish of this assemblage are almost all small in size. None of these remains is burned.

This context included also two snake bones and one limb bone of a micromammal. The snake is a natricine, most prob-

[10] For the taphonomic history of this feature see Wells *et al.* 2006–2007, 40–41.

ably a nose-horned viper (*Vipera ammodytes*).[11] The number of these remains is far too small to permit any elaboration, but it is probably worth mentioning that snake remains have been recovered from various strata throughout the excavated Area D.

STONY FILL UNDERNEATH FLOOR OF WALL 09 (EIA I, *C.* 750 BC)

The animal remains from the stony fill underneath the floor of Wall 09 were hand-picked during the excavation and also retrieved from the water-floated soil samples (WF34, WF35, WF41) amounting to 56 litres. The bone assemblage from this fill consists of 209 bones and fragments. Of those one belongs to a small mammal, seven to fish, and the rest to larger mammals, more specifically cattle, pig, and sheep or goat.[12] A large number of non-identifiable mammal bone splinters cannot be determined more closely (*Table 3*).

The anatomical representation for each taxon is analytically presented in *Table 3*. Cattle are represented only by distal feet bone fragments, the pig only by teeth and a mandible, while the ovicaprids are represented by a number of cranial and postcranial bones. The non-identifiable fragments are mostly long bone splinters.

No distinct burning traces are observed in the assemblage apart from nine minute featureless fragments (<0.5 cm). Cutting traces are not very common either. A bovine tibia fragment bears a knife mark on its proximal articulation and a pig radius shaft is chopped on its proximal end. In addition, one of the non-identifiable long bone splinters has been broken by chopping.

Table 3. Area D, EIA I. Stony fill underneath floor of Wall 09: Taxonomic and anatomical representation.

	Cattle	Pig	Sheep/goat	Non-identifiable mammal	Small mammal	Fish
Radius	1	1	-	-	-	-
Ulna	1	-	-	-	-	-
Metacarpal	2	-	-	-	-	-
Femur	-	-	1	-	-	-
Tibia	1	-	-	-	-	-
Calcaneus	-	-	1	-	-	-
Astragalus	-	-	1	-	-	-
Maxilla	-	1	-	-	-	-
Mandibular tooth	-	1	4	-	-	-
Maxillary tooth	-	-	1	-	-	-
Vertebrae	-	-	-	-	-	2
Non-identifiable	-	-	-	185	1	5
Total	**5**	**3**	**8**	**185**	**1**	**7**

DISCUSSION

The discussion of the Early Iron Age animal bone assemblage at Kalaureia must begin with an assumption: the material under study represents two types of activities within the same chronological horizon, the second half of the 8th century BC. On the one hand we have activities which are related to the construction and use of a space (floor and floor fill deposits) and on the other, a set of actions which resulted in the construction and filling of the pits (Features 07, 08, 09). These activities with the exception of the floor use could be viewed as synchronous.[13]

The animal contents of the Early Iron Age pits and of the floor and floor-fill, so far as can be judged by what has been retrieved during the excavation, is in some respects quite uniform. Cattle bones, some pig and numerous ovicaprid remains along with fish bones (and sea-shells) are constant.[14] No equid, dog, hare, or other wild terrestrial species are present. None of the animal remains found in the features articulates. No medium- or large-size mammal remains are burned apart from several tiny fragments which are mostly calcified and the two bones from Feature 07.

On the basis of the above observations, the first conclusion is that the range of activities which took place in this area during the Early Iron Age involved a very specific range of animals. Considering that the assemblage consisted of 55 identifiable and 590 non-identifiable bone fragments ranging in size from a few millimetres to about 10 cm in length, it could be argued that the presence of a narrow range of taxa is not accidental. A comparison with several other Early Iron Age assemblages (*Table 4*) shows that the phenomenon is localized, observed in some sites/contexts and not in others and is perhaps related to the nature of the specific area. Among the sites presented in the table, which are broadly synchronous to the Kalaureia Early Iron Age strata and represent both domestic and cultic contexts, only Kalaureia and Asine have produced remains of such a restricted range of taxa.

A close examination of the various features, however, illuminates the situation further. Feature 07 contained the only sizeable, albeit fragmented, bone of the whole Early Iron Age assemblage: a very well-preserved goat horn-core with part of the animal's skull apparently attached to it. This feature con-

[11] Lymberakis & Iliopoulos 2019.

[12] The excavation of this fill also produced 129 sea-shells, mostly limpets and purple shells.

[13] Wells *et al*. 2006–2007, 45–46.

[14] The small mammal remains will not be discussed here, as they are considered intrusive (Lymberakis & Iliopoulos 2019).

Table 4. Taxonomic representation at various Iron Age/Geometric sites in Greece.

Site	Date	Taxa	Context	Collection method	References
Kalaureia	Early Iron Age	Ovicaprid; Fish; Cattle; Pig	Cultic and indeterminate	HC, WF	
Asine	Late Geometric	Cattle; Pig; Ovicaprid	Cultic	HC	Mylona unpublished report
Nichoria	Dark Age III	Cattle; Sheep; Pig; Goat; Deer; Equid; Dog	Domestic and cultic	HC	Dysart 2017, table 5.4
Agora, Athens	Geometric (900–700 BC)	Ovicaprid; Dog; Pig; Equid; Cattle; Amphibian; Red deer	Wells, pits, graves	HC	MacKinnon 2014, 218–222 and table 3
Oropos	Early Iron Age (8th–6th centuries BC)	Ovicaprid; Cattle; Pig; Equid; Dog; Cervidae; Leporidae	Various	HC	Trantalidou 2007
Zagora	Geometric (850–700 BC)	Ovicaprid; Pig; Cattle; Dog; Equid; Leporidae; Fish	Various	HC, DS	Alagich 2012, based on data from Barnetson forthcoming
Elike, Sanctuary of Athena Alea	Geometric (8th–mid-6th century BC)	Ovicaprid (sheep); Pig; Cattle; Deer	Cultic	HC	Vila 2000; Psathi 2011
Zabourgo, Tenos island	Geometric (10th–early 7th century BC)	Ovicaprid; Cattle; Pig; Cervidae; Leporidae; Bird	Cultic	Indeterminate	Trantalidou 2012
Kastri, Thasos island	Early Iron Age	Ovicaprid; Cattle; Pig	Cemetery	HC	Halstead & Jones 1992
Plakari, Karystos	Geometric/Archaic (mostly 800–675 BC)	Ovicaprid; Cattle; Pig; Bird; Turtle	Cultic	DS, WS	Groot 2014
Kalapodi	11th-7th century BC	Ovicaprid; Cattle; Pig; Other	Cultic	HC	Stanzel 1991
Eretria	Geometric	Ovicaprid; Cattle; Pig; Equid; Dog; Bird	Cultic	HC	Huber & Méniel 2013
Azoria, Crete	Early Iron Age	Goat; Sheep; Pig; Cattle; Dog; Equid; Deer; Wild goat	Various	HC, WF	Dysart 2017, table 5.4
Kastro, Crete	Late Geometric	Ovicaprid; Pig; Cattle; Wild mammal; Dog; Bird; Fish; Equid; Cat	Domestic dump	HC, DS	Snyder & Klippel 2000
Gortyn, Crete	8th century BC	Ovicaprid; Pig; Cattle; Equid; Dog	Indeterminate	HC	Wilkens 2003
Prinias, Crete	Iron Age	Ovicaprid; Cattle; Fallow deer; Dog; Equid; Wild goat; Pig	Cultic	HC	Wilkens 2003
Kommos, Crete	1020–800 BC	Ovicaprid; Pig; Cattle; Deer; Dog; Bird; Fish	Cultic	HC, WF	Reese 2000, table 6.1, 417–418

The date is given as it appears in the relevant publications. The taxa are ordered according to relative importance at each site/deposit.

tained no fish remains,[15] in contrast with all other Early Iron Age deposits. Also this is the only feature which contained burned bones other than the tiny fragments observed in the rest of the deposits. The rest of the organic remains in this pit are rich in variety of taxa but extremely fragmented and eroded,[16] unlike the pottery fragments, which are in very fresh condition.[17] Noteworthy is the presence of a relatively large amount of fig tree charcoal, which was also probably deliberately deposited.[18] What we see here is the deliberate deposition in the pit of some of its contents (goat horn-core and a few charred bones, pottery fragments, burned fig-tree wood) and the filling of the pit with soil which contained a variety of tiny plant and animal remains which were lying about in the area.

Feature 09 contained all the animals found throughout the Early Iron Age deposits but in this case, the fish bones were extensively burned dark brown and black. The large-size mammal bones were much more heavily eroded than the rest of the bones. This feature resembles the situation with the Protogeometric

[15] The failure to retrieve any fish remains despite the extensive water flotation of the pit's deposits (55 litres) renders their absence fairly certain.
[16] Ntinou 2019; Sarpaki 2019.
[17] Wells *et al*. 2005, 46.
[18] Ntinou 2019.

"Cult deposit" at Asine.[19] There, a number of bones contained within a *pithos*, broken half-way down its body and embedded in the soil, exhibited the same discrepancy of preservation. Consideration of the associated pottery and the taphonomy of animal bones in the *pithos*[20] has led to the conclusion that those bones were of different origin and probably also of different date. No mammal remains from Feature 09 were burned apart from some tiny fragments, which appear to be scattered across the whole Early Iron Age deposit. The extensive burning of the fish remains finds a parallel in the Iron Age Temple B at Kommos, where the fish remains have been interpreted as remains of holocaustic sacrifices, or as the result of a refuse management policy, due to their association with altars and hearths.[21] At the same time, however, other burned organic materials found in the pit exhibit a marked variety in taxa.[22] Furthermore, both the medium-size mammal and fish bones are well preserved. So in Feature 09 we have animal remains of three different origins.[23]

Feature 08 only contained medium-size mammals and fish, but the small size of the sample renders any interpretation unreliable. The floor and floor fill deposits include the same range of taxa, with no burned remains apart from the scattered tiny fragments. The animal remains from these deposits are very small and extensively weathered, probably due to their exposure and trampling on a living surface.

The peculiar burning patterns within the assemblage are of interest. As has already been noted, apart from the two bones in Feature 07, all other burned mammal bones are extremely small fragments, and almost all are calcified, i.e. burned white due to exposure to very high temperatures.[24] This, along with the fragmented and eroded state of the assemblage in general, suggests that the minute burned fragments are residual materials, which were probably lying around, finding their way into various features.[25] It is unlikely that they represent bones burned during cooking, as in that case we would expect to find bones of various sizes burned to various degrees. They more likely represent episodes of total exposure to intense fire, as would be the burning of the god's share on altars[26] or perhaps refuse disposal in a fire.[27]

The first possibility is illustrated by numerous cases throughout the Greek world. Some of the faunal remains from Temple B at Kommos on Crete are found extensively burned. They originate from the Late Geometric hearths and altars of the Temple and their association with layers of ash and other burned material is clear.[28] Similarly, burned and calcified animal bones have been observed at a number of cultic sites, of different dates. In all cases the reported materials are associated with sacrificial structures and in several cases they are from anatomical elements clearly related to sacrifice, such as thighbones and tail vertebrae.[29] The Geometric sacrificial altar at Eretria,[30] the altar of Aphrodite Ourania in Athens,[31] and a *bothros* within the temenos of the Archaic Sanctuary of Aphrodite at Miletus[32] are some such cases, where however, the burned and calcified material has been found concentrated in one area. In the Kalaureia case we could imagine this type of sacrificial leftovers (i.e. heavily burned bones), escaping their deposition spot, trampled over and scattered across the sanctuary over time.

Alternatively, total burning and calcification might be the result of the disposal of food waste in fire or the use of bones as fuel.[33] This alternative is not usually considered, when bones from cultic contexts are discussed, despite the fact that the relevant literature often refers to lighting of fires and to cooking by the worshippers, in a more or less organized manner.[34] Because no Early Iron Age structures of this period, except the pits and small areas of a floor, have been revealed in the sanctuary, the mechanisms behind the burning of the tiny bones remains inconclusive.

The presence of fish is an interesting characteristic of the assemblage. In the past, fish had been thought to be excluded from cultic activities of any date within the historical past, with only some rare exceptions.[35] The recent intensification of research on animal remains and the application of focused field methods, such as water flotation, make it now clear that fish bones in cultic sites are not uncommon.[36] The best example is the fish remains from the Early Iron Age strata from

[19] Mylona 1999; Wells 2011.
[20] Wells 1983, 29; Mylona 1999.
[21] Rose 2000, 509–510.
[22] Ntinou 2019; Sarpaki 2019.
[23] A similar varied deposition is also attested for the charcoal remains (Ntinou 2019).
[24] Shipman *et al.* 1984.
[25] This observation is collaborated by the archaeobotanical and anthracological results which are interpreted in similar terms (Ntinou 2019; Sarpaki 2019).
[26] Ekroth 2017, 37–43 and references therein.
[27] Detailed reports on the alteration of bones due to burning in a holocaustic environment mostly refer to human remains (e.g. Correia 1997); for the relevant research in Greek archaeology Ubelaker & Rife 2007, esp. 41–42 and references therein; recently Dibble 2017, 175–177; for an ethnographic example of burning bones in the fire as a means of refuse disposal see Gifford-Gonzales 1989, 186; for an archaeological parallel see Rose 2000, 510.
[28] Reese & Ruscillo 2000, 419–420, table 6.1; Shaw 2000, 682.
[29] For a discussion of the phenomenon see Forstenpointner 2003.
[30] Chenal-Velarde & Studer 2003.
[31] Reese 1989.
[32] Peters 1993; Peters & von den Driesch 1992; Zimmermann 1993.
[33] Gifford-Gonzales 1989, 187; Buikstra & Swegle 1989; Davis 1987.
[34] See for example Bergquist 1998; Ekroth 2017; but MacKinnon 2013, 143.
[35] Eels and tunas have been regarded as the only fish suitable for sacrifices: Durand 1989, 127; discussion of the phenomenon in Mylona 2008, 97.
[36] Mylona 2015; Theodoropoulou 2017, 673–674.

Table 5. Area D, Archaic. Mammal bones from Archaic deposits: richness in bones and water flotation.

Date	Context	Total NISP	Non-identifiable	Number of WF samples	Amount of WF soil in litres
A I	Fill above Early Iron Age remains	34	513	4	91
A II	Associated with the supposed altar (Feature 05)	4	54	6	125
A II	Close to bedrock	5	28	-	-
A II	Primary deposit underneath Building D	38	380	1	22
A II	Deposits more exposed than in the interior of D	11	258	4	91
A II	Disturbed deposits	26	114	2	44
A II	Disturbed and exposed deposits	5	29	-	-
Total AII		**89**	**863**	**13**	**282**
A III	Deposit of crushed purple shells	4	117	4	65
A IV	Terrace fill	6	161	2	50
A IV	Disturbed	1	5	-	-
A IV	Stone packing above kiln (Feature 10)	-	4	1	12
A I–III	Close to bedrock	-	190	2	50
Total		**134**	**1,853**	**26**	**550**

Temple B at Kommos, Crete.[37] There, a large amount of fish remains was located at various spots, but mostly concentrated near the so-called Hearth 2. In that case the fish remains have justly been interpreted as possible burned offerings.[38] The burned fish remains from Feature 09 could represent a similar case, i.e. being the remains of an offering. The unburned fish bones which have been found in other features, both pits and floor could represent remains of meals. These meals, however, would include fish boiled, fried or stewed, but not cooked over a charcoal fire as such a process would leave distinct burning patterns on the bones.[39]

[37] Rose 2000, 509–510.
[38] Rose 2000, 536.
[39] Nicholson 1995.

Area D. The Archaic mammal and fish bones

The animal remains from the Archaic strata in Area D were collected by hand picking and water flotation of 26 soil samples amounting to 550 litres of soil (*Table 5*). The Archaic deposits as a whole produced 1,987 mammal remains, among which only 134 (6.7%) are identifiable and belong to an indeterminate equid, cattle, pigs, sheep and goats, and to a hare. The assemblage also consists of eleven identifiable and eleven non-identifiable fish bones (*Table 6*), two bird bones, four micromammal remains and one bone from a frog.[40] Among the bones the majority originate from the water-floated soil samples. The material is preserved in a fairly bad and fragmented condition. Erosion commonly occurs (18.6% of the identifiable fragments), varying in intensity in different contexts (*Table 7*).

The Archaic centuries apparently saw a multitude of activities in the area of Building D.[41] The bone material dating to this period will be examined by phase, and whenever appropriate, bones linked to specific features will be discussed in detail (*Fig. 2*).

A I (7TH CENTURY BC)

The earlier Archaic phase (A I) is represented by 34 identifiable bones and 513 non-identifiable ones (*Tables 5* and *8*). A total of 80% of these are tiny bone splinters (<1 cm), and their high number is probably a result of the extensive water flotation of soil samples from this horizon. One of the identifiable and 21 of the non-identifiable fragments are burned black/white.

The assemblage consists of remains of an equid (1, 2.9%), of cattle (3, 8.8%), pig (8, 23.5%), and of ovicaprids (9, 26.4%), which are equally shared between sheep and goats. Also, the assemblage contains remains of one hare (1, 2.9%), of fish (5, 14.7%), of birds (2, 5.8%), and remains of two micromammals (4, 11.7%) (*Table 8*). It is interesting that in the A I deposits, pigs are almost as common as the ovicaprids. This is a feature quite unlike all other sub-assemblages on site. The relative importance of the other taxa is fairly ambiguous, because all relevant percentages are based on a very small number of remains. The pattern of the anatomical part representation suffers from the small number of remains as well (*Table 9*).

[40] For a detailed discussion of birds and micromammal remains see Serjeantson 2019; Lymberakis & Iliopoulos 2019. The Archaic strata also produced 648 hand-collected sea-shells, among which the purple shells, limpets, top-shells, and ceriths are the commonest (Syrides 2019).
[41] For a detailed discussion of the Archaic strata see Wells *et al.* 2005; 2006–2007, 10–11, 17–18, 59–67; also Penttinen & Mylona 2019.

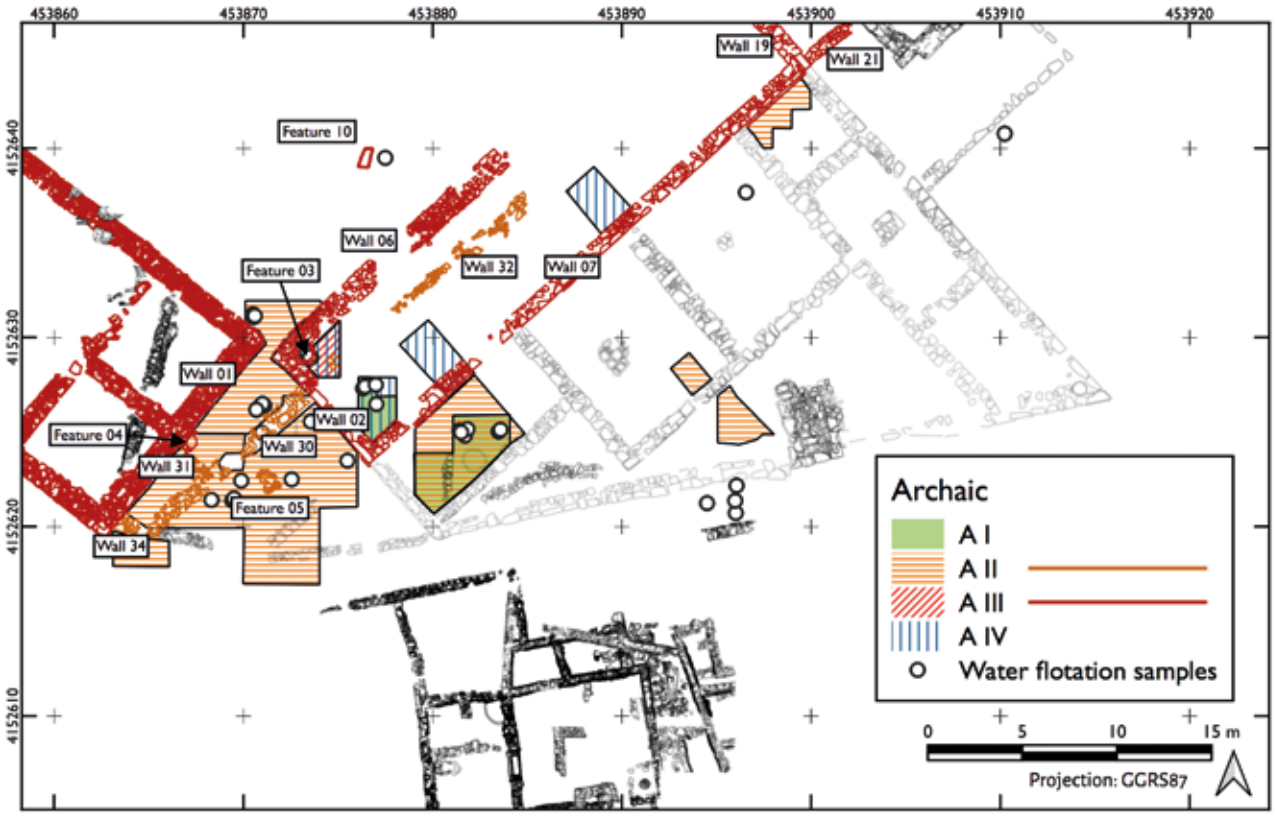

Fig. 2. Plan of Area D which shows the Archaic excavated deposits and features discussed in the text and the positions of water-floated soil samples. By R. Rönnlund.

Table 6. Area D, Archaic deposits. Fish remains.

Date	Context	Total number of remains	Identifiable remains
A I	Fill above Early Iron Age remains	11	2 right premaxillae, large grouper (*Epinephelus* sp.). 1 anterior thoracic vertebra, Sparidae, L: 4.2 mm. 1 anterior thoracic vertebra, unidentified, L: 4.3 mm. 1 caudal vertebra, Sparidae small, L: 2 mm. 1 indeterminate vertebra of MD fish. 5 non-identifiable of MD fish.
A II	Associated with the supposed altar (Feature 05)	-	-
A II	Close to bedrock	-	-
A II	Primary deposits underneath Building D	4	1 posterior abdominal vertebra of indeterminate SM fish. 3 non-identifiable, of MD fish, burned brown.
A II	Deposits more exposed than in the interior of D	6	1 right otolith of a meager (*Sciaena umbra*), L: 10.5 mm, W: 8.2 mm. 1 caudal vertebra of Sparidae, L: 3.5 mm. 1 incisor of gilt-head sea bream (*Sparus auratus*). 3 non-identifiable, of MD fish.
A II	Disturbed deposits	-	-
A II	Disturbed and exposed deposits	-	-
A III	Deposit of crushed purple shells	-	-
A IV	Terrace fill	1	1 caudal vertebra, indeterminate LG fish—burned.
A IV	Disturbed deposit	-	-
A IV	Stone packing above kiln (Feature 10)	-	-
A I–III	Close to bedrock	-	-

Table 7. Animal bones from Archaic deposits. Preservation.

Date	Context	Burning	Erosion	Total NISP
A I	Fill above Early Iron Age remains	1	1	34
A II	Associated with the supposed altar (Feature 05)	-	1	4
A II	Close to bedrock	-	3	5
A II	Primary deposits underneath Building D	-	2	38
A II	Deposits more exposed than those from the interior of D	-	5	11
A II	Disturbed deposits	1	6	26
A II	Disturbed and exposed deposits	-	2	5
A II	**Total A II**	**1**	**19**	**89**
A III	Deposit of crushed purple shells	-	3	4
A IV	Terrace fill	-	1	6
A IV	Disturbed	-	1	1
A IV	Stone packing above kiln (Feature 10)	-	-	-
A I–III	Close to bedrock	-	-	-
Archaic total		**2**	**25**	**134**

Table 8. Area D, A I. Taxonomic representation.

Taxa	NISP	%
Equid	1	2.9
Cattle	3	8.8
Pig	8	23.5
Sheep/goat	5	14.7
Sheep	2	5.8
Goat	2	5.8
(Ovicaprid total)	(9)	(26.4)
Hare	1	2.9
Large-size mammal	2	5.8
Fish	5	14.7
Bird	2	5.8
Small mammal	3	11.7
Total	**34**	**100**
Mammal non-identifiable	**513**	

The bones of smaller, non-domestic animals are of interest. The single hare remain and the four indeterminate micromammals[42] could be part of the local wild fauna in and around the sanctuary, as could the two small birds identified in the assemblage.[43]

Table 9. Area D, A I. Anatomical part representation.

Body part	Anatomical element	Equid	Cattle	Pig	Ovica-prid	Sheep	Goat	Hare	Indeterminate taxon
Front legs	Scapula	-	-	1	-	-	-	1	-
	Humerus	-	1	1	1	-	-	-	-
	Radius	-	2	-	-	-	-	-	-
Back legs	Pelvis	-	-	-	-	-	1	-	-
	Tibia	-	-	1	-	1	-	-	-
	Metatarsal	-	-	-	-	-	1	-	-
	Calcaneus	1	-	-	-	-	-	-	-
	Astragalus	-	-	-	-	1	-	-	-
Both legs	1st phalanx	-	-	1	-	-	-	-	-
Head	Mandibular condyle	-	-	1	-	-	-	-	-
	Mandible	-	1	2	3	-	-	-	-
	Maxilla	-	-	1	1	-	-	-	-
Trunk	Rib								1
	Vertebra								1

Fish remains are fairly common (*Table 6*). They belong to grouper (*Epinephelus* sp.) and to a medium-size (15–30 cm) sea bream (Sparidae). Some of the fish remains are unidentifiable. The fish were undoubtedly deliberately brought on site and the fact that two of the spines are burned black or brown may be an indication for their cooking.[44] The fish bones belong both to large individuals (two groupers) and to medium-size ones (at least one sea bream), all inshore marine fish.

The A I deposits, which lay immediately above the Early Iron Age strata, are fairly mixed in nature and include both Geometric and later Archaic materials.[45] Therefore, any assessment of the character of its bone assemblage must remain tentative.

A II (6TH CENTURY–HELLENISTIC)

The soil and debris that accumulated during the A II phase are spread at different spots around Area D[46] (*Fig. 2*) and they can be divided into various groups, according to their position and the degree of disturbance they have suffered. The richness in bones in each group varies (*Table 5*).

[42] Lymberakis & Iliopoulos 2019.
[43] Serjeantson 2019.
[44] Spines are among the first bones to be burned when fish are chargrilled, as they are totally exposed to heat.
[45] Wells *et al*. 2006–2007, 60.
[46] Wells *et al*. 2006–2007, 14–15.

Table 10. Area D, A II. Taxonomic representation in different contexts.

	Associated with the supposed altar (Feature 05)		Close to bedrock in area west of the supposed altar (Feature 05)		Primary deposit exposed from underneath Building D		Exposed primary deposits outside the later Building D		Disturbed		Disturbed and exposed	
	NISP	%	NISP	%	NISP	%	NISP	%	NISP	%	NISP	%
Cattle	1	25	2	40	-	-	2	11.8	8	30.8	1	20
Pig	1	25	-	-	4	13.8	3	17.6	2	7.9	2	40
Sheep/goat	2	50	2	40	13	48.3	5	29.4	12	46.2	2	40
Sheep	-	-	1	20	1	3.4	-	-	2	7.9	-	-
Goat	-	-	-	-	3	10.3	-	-	2	7.9	-	-
(Ovicaprid total)	(2)	(50)	(3)	(60)	(17)	(58.6)	(5)	(29.4)	(16)	(61.5)	(2)	(40)
Medium-size mammal	-	-	-	-	2	6.9	-	-	-	-	-	-
Fish	-	-	-	-	4	13.9	7	41.2	-	-	-	-
Small mammal	-	-	-	-	2	6.9	-	-	-	-	-	-
Total	**4**	**100**	**5**	**100**	**29**	**100**	**17**	**100**	**26**	**100**	**5**	**100**

Bones from strata associated with the supposed altar, Feature 05 (*Table 10*)

This group of bones consists of a few identifiable bones of cattle, pig, and ovicaprids and several non-identifiable tiny splinters (<0.5 cm). The identifiable bones are two ovicaprid teeth, one pig tooth and one bovine 1st phalanx, all very small bones. All the bones from these deposits are much eroded and eight of the tiny splinters are burned either black or white. No microfaunal remains have been found. The association with the supposed altar (Feature 05) makes the absence of any sizeable bones conspicuous. This area, despite the systematic collection and the water flotation of large amounts of soil, produced fewer bones than the average fill around Building D.[47] This observation points to a problem concerning the nature of this feature, given the somewhat disturbed and unclear condition of the deposits around it (the feature was part of the space arrangement in that area for a long period of time). It has been suggested, based on the morphology and location of Feature 05 that it might have been an altar. The only burned bones in the area, however, appear to be concentrated east of the feature and they are of a very small size. The burning of these tiny splinters appears very similar to those observed in the Early Iron Age floor and floor fill deposit. The strata from which the bones that are presented here originate appear to have been deposited over time mostly during the A II phase.[48] The fact that they do not contain large numbers of bones, burned or otherwise, but only the few residual bone fragments,[49] could perhaps be indicative of the type of offerings on the supposed altar. It could be suggested that this feature was not used for animal sacrifice that involved the burning of parts of the animal. Perhaps it was an altar dedicated to vegetal offerings. If that was the case however, no burning was involved, as only scant seed and fruit remains have been found around this feature. The presence of considerable amounts of the smoke-generating fig wood charcoal, a rather uncommon find on site, however, strengthens the hypothesis that Feature 05 was probably an altar.[50]

Bones from strata close to bedrock in area west of Feature 05 (*Table 10*)

This area produced very few bones, but they include a few fragments of cattle and sheep. The majority of these bones, however, are non-identifiable, highly eroded small splinters. None of these bones is burned.

Primary accumulations exposed from underneath Building D (*Table 10*)

These deposits produced not only the largest but also the richest bone assemblage, among the different A II contexts. This may be due to the fact that these A II strata had been protected by the later construction fill.[51] This group of animal remains includes bones of pig, sheep, and goats, among which goats are by far the most common. It also includes remains of

[47] It produced, however, a considerable amount of carbonized plant remains, charcoal, and seeds (Ntinou 2019, table 3; Sarpaki 2019, table 3c).
[48] Wells *et al.* 2006–2007, 49.
[49] The deposits around altars associated with animal sacrifice and the burning of animal parts are usually very rich in bones (e.g. Apollo Dapnhephors at Eretreia, Chenal-Velarde & Studer 2003; Artemision at Ephesos, Forstenpointner 2003; Temple of Aphrodite at Millet, Peters 1993; Altar of Aphrodite Ourania at Athens, Reese 1989; Sanctuary of Demeter on Mytilene, Ruscillo 1997; for a review and critical discussion Ekroth 2017).
[50] Sarpaki 2019; Ntinou 2019.
[51] Wells *et al.* 2006–2007, 17.

Table 11. A III. Deposits of crushed purple shells. Richness in bones and WF data.

	Deposit of crushed purple shells in D04	Deposit of crushed purple shells in D05
Identifiable bones	4	-
Non-identifiable bones	106	11
Number of soil samples	3	1
Amount of WF soil (in litres)	35	30

an indeterminate small mammal and a snake[52] and four fish bones. The latter all belong to small fish (<15 cm) and two of the spines are burned brown (*Table 6*).[53] Six of the mammalian non-identifiable bones are burned black or white and one long bone splinter bears a chop mark.

It is interesting that despite the relatively good preservation of bones within the strata, which permitted the survival of fish and micromammal bones, no cattle remains have been located. This absence is unexpected, but could be attributed to chance, since cattle bones are present in almost all other A II deposits. All anatomical parts are present for all taxa, but the low number of bones does not permit the detection of any pattern.

Primary deposits from outside the later Building D (*Table 10*)

All A II strata excavated outside Building D are more eroded than those recovered from underneath it and despite the more extensive sampling and water flotation taking place there, the total amount of bones is smaller. Cattle, pig, ovicaprids, and fish have been identified. Among the fish bones (*Table 6*) are a medium-size meager (*Sciaena umbra*), a large gilt-head sea bream (*Sparus auratus*), and one very small fish, possibly a small sea bream or picarel (Sparidae).

Disturbed and exposed material at various phases in the Archaic history of the site (*Table 10*)

This collection consists of two sub-groups, but here they are discussed together, because they share similar features. They are both poor in quantity of bones and in taxonomic variety. They are characterized by extensive erosion of both the identifiable and the non-identifiable elements. Perhaps their condition is related to the repeated disturbance of the sediments.

The A II strata as a whole produced a fairly badly preserved bone assemblage, which is relatively poor (in view of the amount of soil excavated and water-floated, *Table 5*). This is partly due to the disturbed nature of the soil. It could also be due to the damage affected on the bones which were exposed on an activity floor in antiquity. Alternative (or even additional) disturbance from the action of later building works might have resulted in the observed damage to the bones. Zooarchaeologically we are not able to discern which might be the possible cause.

A III—the purple shell deposits (*Tables 5* and *11*) (*c.* 500 BC)

The animal bones from the deposits of the A III phase were collected in association with the purple shell accumulations discussed below.[54] The rest of the excavated deposits of this phase were sterile as far as animal remains are concerned. All soil which contained the crushed purple shells was water-floated (4 samples, 65 litres). The purple shell deposits were located in two different spots, one in D05, north of the the supposed altar (Feature 05), and the second, in D04, close to the cistern (Feature 03).[55] They consist mostly of crushed purple shells,[56] but from among those were collected several bone fragments. The concentration in D05 produced eleven minute non-identifiable splinters (<0.5 cm), while that from D04 produced 106 non-identifiable splinters, mostly tiny, but with a few reaching 5 cm in length. The four identifiable bones found in this assemblage are one cow mandibular tooth and one each of an ovicaprid tibia, radius, and incisor.

This last find is the most interesting, as it is a milk tooth, virtually unworn. This is a tooth that erupts in ovicaprids in the first week after birth. By the unworn state of this particular tooth, we can deduce that this animal must have been slaughtered a few weeks after birth at the most. As traditional breeds of sheep and goats used to give birth once a year, around February, we could perhaps deduce that this animal had been incorporated into the assemblage of crushed purple shells some time in the early spring.

[52] Lymberakis & Iliopoulos 2019, table 2.

[53] These deposits also contained a considerable amount of sea-shells, very similar in composition to that belonging to the A I phase.

[54] Purple shell is the common name used to denote two species of the Muridiae family, the *Hexaplex trunculus* and *Bolinus brandaris*. These, along with *Stramonita haemastoma* were used in antiquity all along the Mediterranean coasts to produce purple dye. The by-products of this industry were used for a variety of purposes, including lime production; see indicatively Alfaro & Mylona 2014.

[55] Wells *et al*. 2006–2007, 5–6.

[56] Syrides 2019, table 10.

If the crushed purple shells had been a cache of material prepared to be used as temper during building work, for example, then the bone splinters among them could be additions to the assemblage. This might explain the exceptionally eroded and fragmented state of the bones.

A IV (AFTER *C.* 500 BC)

Several features dated to the latest Archaic phase were excavated in Area D. The fill retained by Walls 02 and 07 is one. The northern part of this, due to its disturbed nature, is another, and finally the stone packing of the kiln (Feature 10) is a third.[57] These deposits were very poor in bone (*Tables 5* and *12*). The fill produced only six identifiable bones. Among those were two bovine teeth, one ovicaprid humerus fragment, one ovicaprid tooth, one pig tooth, and one indeterminate large-size fish caudal vertebra. Furthermore, 161 non-identifiable bone splinters smaller than 1 cm were recovered. Among those, eight fragments are burned white. The small and eroded state of this material indicates a highly disturbed depositional history. Perhaps the material in the fill represent items already exposed and trampled over on the ground before they were incorporated in to the terrace fill.

The disturbed part of the fill produced only one ovicaprid metatarsal fragment, extensively eroded, and five non-identifiable bone splinters. The stone packing of the kiln (Feature 10) was also very poor in bones and only produced four tiny non-identifiable, highly eroded bones.

A I–III, CLOSE TO THE BEDROCK

These deposits were very poor in animal remains. Despite the careful collection and the water flotation of two soil samples amounting to 50 litres of soil, only 190 tiny mammal bone splinters have been found with no identifiable bone among them. Nine of these non-identifiable fragments are burned black or white.

DISCUSSION

The bone material from the Archaic strata is uniform in two respects: it is very fragmented and eroded. These preservation traits may be the result of the exposure of the bones to the elements and to trampling before deposition. This might have happened if the Archaic deposits' accumulation had been gradual and in open space, as is indeed suggested by other classes of evidence.[58] Extreme fragmentation and erosion could also be the result of the reworking of the material through repeated deposition of the same soil in various applications.

Table 12. A IV. Richness in bones and WF data.

	Terrace fill	Terrace fill disturbed	Kiln (Feature 10) stone packing
Identifiable bones	5	1	-
Non-identifiable bones	161	6	4
Number of soil samples	2	-	1
Amount of WF soil (in litres)	50	-	12

Leaving the poor preservation aside, the Archaic bone assemblage appears to be quite similar to the Early Iron Age in having the basic combination of mammals-fish and tiny burned splinters, as opposed to larger burned bones. This could indicate some form of continuity in the practices that took place in the general area. Its poor preservation, however, hinders any further discussion at this point.[59]

Area D. The Late Classical/Early Hellenistic mammal and fish bones

The archaeological strata of the Late Classical/Early Hellenistic horizon in Area D (*Fig. 3*) produced 1,098 bones, of which fewer than 10% are identifiable. These were collected by hand picking during the excavation and by the water flotation of twelve soil samples amounting to 270 litres of soil. The Late Classical/Early Hellenistic deposits are of two types,[60] those belonging to C I phase (*c.* 325 BC) and those which can be attributed to the later C II phase (after 325 BC). In the first group (*Table 13*) the majority of remains originate from the fill brought in from elsewhere. This is the richest Late Classical/Early Hellenistic sample both in terms of quantity of remains and of variety of taxa. Some of the C I strata were later disturbed. The bone sample from the disturbed strata is fairly poor. A pit dug into the construction fill, in this phase, is also very poor in animal remains. The C II material originates from the floor level in the westernmost of the dining rooms in Building D. This is also a poor sample, but the dearth of bones might be attributed to damage caused by the deposit's exposure to the elements since the initial clearing of the area in 1997.[61] The high frequency of samples which only produced

[57] Wells *et al*. 2006–2007, 9–11.
[58] Wells *et al*. 2006–2007, 49–67, esp. 59.
[59] More and better-preserved assemblages of Archaic zooarchaeological material have been produced from excavations at other locations within the sanctuary, and material from Areas D and C will be re-examined and contextualized in relation to them.
[60] Wells *et al*. 2006–2007, 68–71; Penttinen & Mylona 2019, fig. 6.
[61] Wells *et al*. 2003, 54–55.

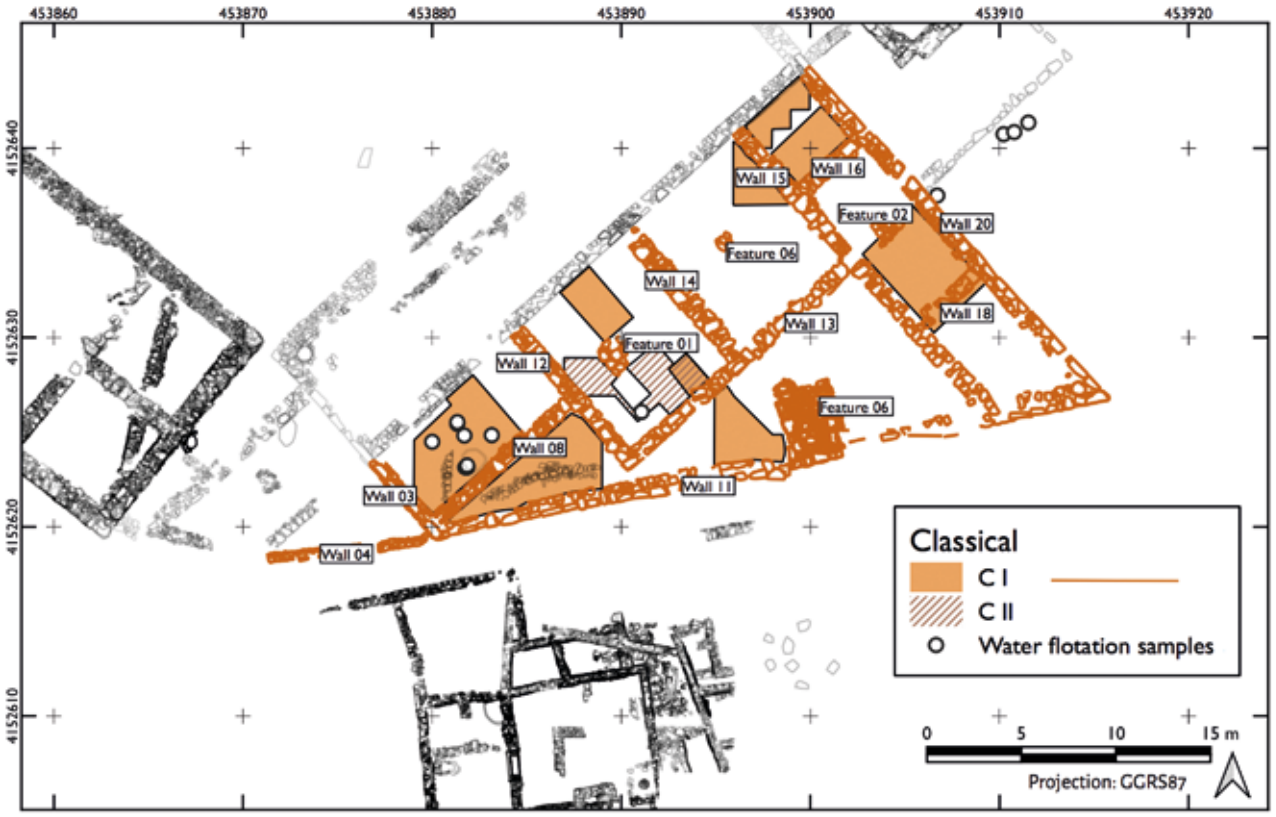

Fig. 3. Plan of Area D which shows the Late Classical/Early Hellenistic excavated deposits and features discussed in the text and the positions of water-floated soil samples. By R. Rönnlund.

non-identifiable remains i.e. remains too small or eroded to permit any identification (*Table 14*) reflect the bad preservation of all the above contexts.

The construction fill is taxonomically varied. It produced remains of cattle, pigs, sheep and goats; also remains of hare, fish, bird (*Gallus gallus*),[62] micromammals, among which a shrew (*Suncus etruscus*) and a squirrel-size animal.[63] The fish remains (*Table 15*) included the gilt-head sea bream (*Sparus auratus*), the parrotfish (*Sparisoma cretense*), and some small fish (Sparidae).

Among the medium-sized and larger mammals, cattle are quite common, as are the pigs. The assemblage, however, is dominated by the ovicaprids. Both sheep and goats are present, with goats being more common. One of the ovicaprid teeth is pathological, having its roots expanded. A goat horn-core from a female animal bears another interesting feature, a depression on its medial side known as "thump-mark".[64] Such a depression is the result of repeated and excessive lactation, and one could expect it to appear on the horn-cores of an animal intensively exploited for milk.

The original nature of the events that produced these bones is uncertain. Some insights, however, could be gained from the intrinsic traits of the assemblage, despite the fact that no ageing data are available and the anatomical part representation, for all taxa, is not particularly informative, because of the assorted nature of the deposit, whose exact origin from within the sanctuary remains unknown. Three of the bones however, a cow metacarpal, a pig humerus, and an indeterminate scapula fragment, bear traces of chopping. Furthermore, a pig pelvis fragment and a bovine metacarpal have areas of burning on one side only, in a way which is compatible to their deposition on a dying fire. Among the non-identifiable bone splinters 24 are burned black or white. These features tentatively indicate that the bones are the remains of dining. This scenario is further supported by the presence of remains of coastal fish of various sizes. The small mammal bones are probably intrusive, as they could have lived in the open or wooded areas around the sanctuary.

The disturbed CI deposits (*Table 13*) do not add any new information, being small and poor in preservation and taxo-

[62] Serjeantson 2019.
[63] Lymberakis & Iliopoulos 2019.
[64] Albarella 1995, 699–704.

Table 13. Area D. Animal bones from Late Classical/Early Hellenistic deposits.

	C I—construction fill		C I—construction fill disturbed		C I—pit within construction fill		C II	
	NISP	**%**	**NISP**	**%**	**NISP**	**%**	**NISP**	**%**
Cattle	10	12.5	1	25				
Pig	10	12.5	1	25	1	33.33		
Sheep/goat	37	46.2	2	50			2	100
Sheep	1	1.2						
Goat	2	2.5						
Hare	2	2.5						
Medium-size mammal	1	1.2						
Fish	9	11.2			2	66.66		
Bird	1	1.2						
Small mammal	7	8.7						
Total	**80**	**100**	**4**	**100**	**3**	**100**	**2**	**100**
Mammal, non-identifiable	795		81		61		67	
Number of WS soil samples	9		-		1		2	
Amount of WF soil in litres	198		-		22		50	

nomic variety. The pit dug in the construction fill only contained an assortment of small, much-eroded bone splinters, two of which are burned white. It appears that no animal remains had been deliberately deposited in the pit.[65] The bones found during the excavation are probably part of the general bone content of the deposits which eventually filled the pit.

The animal remains from the C II deposits in the area of Building D are exceptionally scant. Only two ovicaprid teeth and several non-identifiable bones were recovered, all extremely eroded. Therefore, no comparison between these bones and the bones from the earlier phase is possible.

Area D. The Hellenistic/Early Roman mammal and fish bones

The animal remains from the Hellenistic horizon of the sanctuary are presented here as two groups (*Fig. 4*). The first is a collection of bones from deposits disturbed in antiquity or later in Area D. The second is an assemblage from a closed context, which contained the remains of a meal, in the form of food items, charcoal, pottery, and a variety of small objects.[66] This is conventionally called here the "dining deposit".

Table 14. Area D. Mammal bones from Late Classical/Early Hellenistic deposits. Preservation.

	C I—construction fill	C I—construction fill disturbed	C I—pit within construction fill	C II
Gnawing	1			
Burning	2			
Erosion	17	2	1	
Total number of samples	**39**	**10**	**3**	**5**
Samples with no identifiable remains	8 (20.51%)	6 (60%)	1 (33.33%)	4 (80%)

Table 15. Area D. Fish remains from Late Classical/Early Hellenistic deposits.

	Number of fish bones	Identifiable remains
C I—construction fill	2	1 molar of sea bream, Sparidae 1 right dentary of gilt-head sea bream (*Sparus auratus*), MD 1 caudal vertebra of sea bream or picarel (Sparidae), SM 1 left dentary of a parrotfish (*Sparisoma cretense*), MD 3 non-identifiable bones, MD
C I—construction fill disturbed	-	-
C I—pit within construction fill	-	-
C II	-	-

[65] The pit did not contain any sea-shells either, Syrides 2019.
[66] Wells *et al.* 2005, 164–179; 2006–2007, 72–73; Penttinen & Mylona 2019.

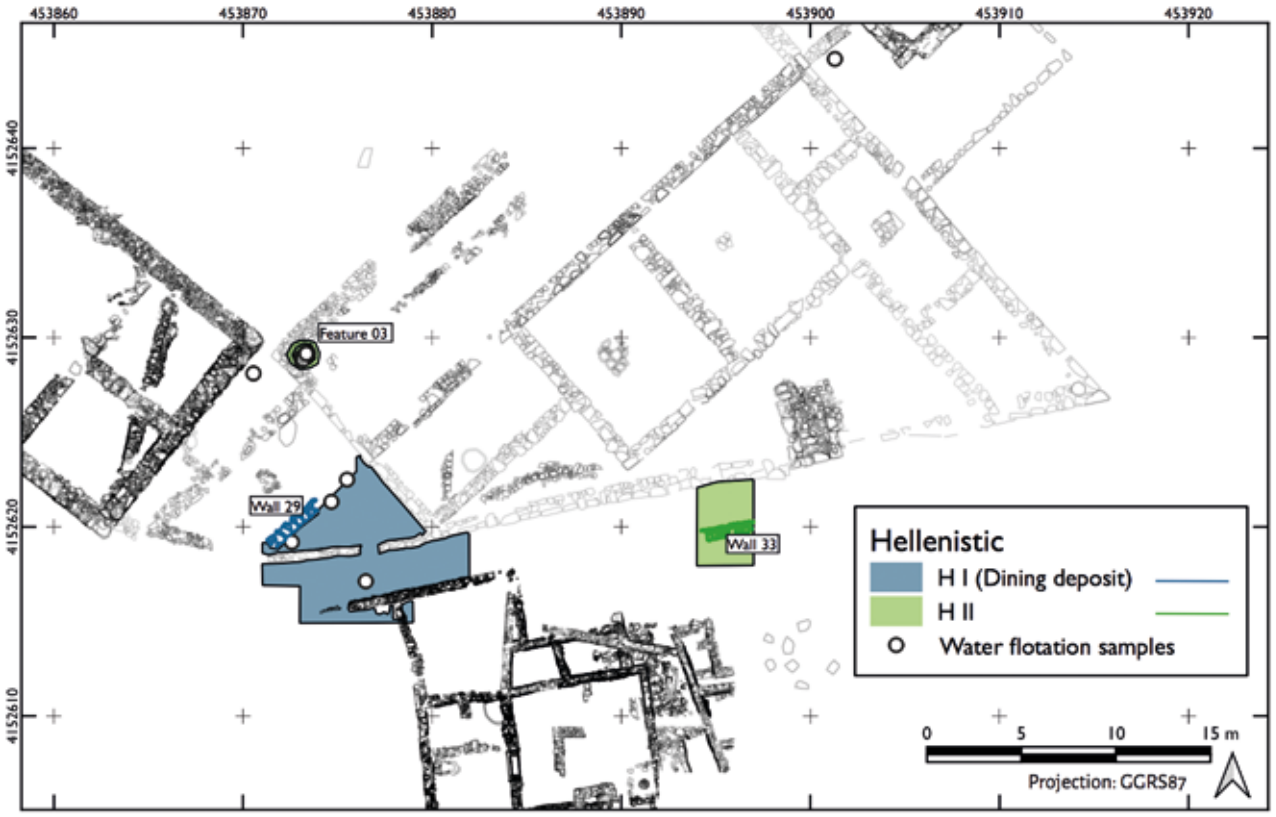

Fig. 4. Plan of Area D which shows the Hellenistic and the Late Hellenistic/Early Roman excavated deposits and features discussed in the text and the positions of water-floated soil samples. By R. Rönnlund.

Table 16. Area D. Hellenistic deposits disturbed in antiquity and later.

	NISP	%
Cattle	4	8.9
Pig	9	20
Sheep/goat	18	40
Sheep	6	13.33
Goat	4	8.9
Medium-size mammal	4	8.9
Non-identifiable	97	

HELLENISTIC DEPOSITS DISTURBED IN ANTIQUITY AND LATER

Certain deposits in Area D can be generally dated in the Early Hellenistic period but had been later disturbed, both in antiquity and in modern times. The bones from these deposits have all been hand collected. No soil sample was taken because of the disturbed nature of the sediments. This assemblage is fairly rich in animal remains (45 identifiable and 97 non-identifiable bones), which are preserved in a very good shape, despite the extensive disturbance. The assemblage is presented below in *Table 16*.

Among the assemblage there have been identified bones of cattle, pig, sheep and goat. Because of the collection method applied (hand collection), no microfaunal remains have been located. Among the identifiable bones eight are burned brown as are some of the non-identifiable ones. In addition, two of the bones, one sheep radius and one ovicaprid femur, had been chopped. All anatomical parts of each taxon appear to be present, even parts of the trunk. This becomes evident by the presence of vertebrae and ribs among the non-identifiable remains.

H I— THE "DINING DEPOSIT" (*C.* 165 BC)

A large amount of animal remains originate from the so-called "dining deposit", from the triangular area, west of Building D (*Fig. 5*). Some material, bone and other, appears to have spilled over the low southern wall of the triangle.[67] The bone sample from this context is very similar in composition to that from within the triangle. Furthermore, some contexts from the triangular feature appear, on pottery grounds, to be mixed, but

[67] For excavation details Wells *et al.* 2005, 164–179; 2006–2007, 71–72.

Fig. 5. The area of the "dining deposit". By E. Savini.

mostly containing material from the main body of the "dining deposit".[68] A comparison between the faunal material from the mixed contexts and that from the triangle proper does not show notable differences, apart from the lower occurrence (NISP) of certain taxa, i.e. cattle and fish (*Table 17*). Here all these remains will be treated as part of the same assemblage.

The animal remains from the "dining deposit" have been collected by hand picking during the excavation and from six water-floated soil samples, amounting to 171 litres of soil. The assemblage consists of 3,337 bones. About half of them belong to medium- and large-size mammals, 1,530 to fish, three to birds[69] and 14 to small mammals.[70] The deposit also produced several sea-shells.[71] Among the bones only 417 (16.93%) are identifiable. The following discussion refers only to the mammal and fish bones.

Taphonomy—how was the assemblage formed?

Preservation of the animal bone assemblage within the "dining deposit" is fairly good (*Table 18*). Weathering due to exposure of the bones to the elements is absent.[72] Furthermore, any traces of trampling, such as weathered breakage lines, are also absent.[73] The good preservation of the assemblage probably explains the high survival rate of the numerous fragile fish remains (see below). Erosion, which could be attributed to root etching[74] is minimal. Generalized erosion of the bones' surface is more common. 32 (7.67%) identifiable bones are eroded fairly lightly, while only seven out of the 47 (14.48%) samples which produced non-identifiable remains comprise mostly eroded bone fragments. The erosion traces observed on the bones of this assemblage, i.e. pitting of the bone's surface and slight brittleness, are compatible with those reported by Richard Lee Lyman as products of an acidic depositional environment.[75] We are in no position to define the origin of the soil's acidity. It could be an inherent characteristic of the soil found in the area. However, considering that the bone remains originate from what appears to have been a refuse pile, restricted by walls, it could be argued that the acidity might have resulted partly from the decomposition of the organic matter within this pile. An observation made during the water flotation of a soil sample from that area, that the soil had

[68] Wells *et al*. 2005, 168–169.
[69] Serjeantson 2019.
[70] Lymberakis & Iliopoulos 2019.
[71] The sea-shells in this context are dominated by limpets, top shells, and ceriths, some of which show clear traces of consumption, Syrides 2019.
[72] Lyman 1994, 354–360; Behrensmeyer 1978. This feature does not appear in the corresponding table (*Table 18*).
[73] This feature does not appear in the corresponding table (*Table 18*).
[74] Lyman 1994, 375.
[75] Lyman 1994, 422.

Table 17. Area D, Hellenistic. "Dining deposit". Taxonomic representation in disturbed and undisturbed levels.

	Undisturbed levels		Disturbed levels		Total		
	NISP	**%**	**NISP**	**%**	**NISP**	**%**	**MNI**
Equid	1	0.28	-	-	1	0.23	1
Cattle	23	6.53	1	1.5	24	5.57	2
Pig	35	9.94	6	8.95	41	9.83	3
Sheep/goat	140	39.77	38	56.7	178	42.68	10
Sheep	5	1.42	2	2.85	7	1.67	1
Goat	14	3.97	2	2.98	16	3.83	2
Deer	1	0.28	-	-	1	0.23	1
Medium-size mammal	22	6.25	-	-	22	5.27	7
Fish	102	28.97	9	13.43	111	26.61	>30
Bird	1	0.28	2	2.98	3	0.71	?
Small mammal	8	2.27	7	10.44	15	3.59	?
Total	**352**	**100**	**67**	**100**	**419**	**100**	
Mammal, non-identifiable	1,577		230		1,807		
Fish non-identifiable	1,092		21		1,213		

Table 18. Area D, Hellenistic. "Dining deposit". Bone preservation.

	NISP	**%**
Gnawing	6	1.43
Burning	21	5.03
Erosion indeterminate	32	7.67
Root action	2	0.47

Table 19. Area D, Hellenistic. "Dining deposit". Bone fragmentation.

	<1 cm	**0–2 cm**	**0–5 cm**	**5–10 cm**
Number of samples	7	6	31	4
Number of WF samples	7	1	0	0

The length ranges refer to the dominant fragment size within the sample.

a fatty texture, quite different from that of soil samples from elsewhere around the site, supports such an interpretation.

Most alterations to the assemblage have occurred pre-depositionally, i.e. before the incorporation of the animal remains into the soil. These involve the fragmentation, burning, and gnawing of the bones. The mammal remains from the "dining deposit" are characterized by a high degree of fragmentation. If we take the size of the non-identifiable bone splinters as a measure of fragmentation (*Table 19*), among the 48 bone samples from this area, which have produced non-identifiable remains, only four are dominated by bones larger than 5 cm in length. Seven samples, all water-floated, have produced the vast majority of the tiny bone fragments, smaller than 1 cm in length, and the rest, all hand-collected, are dominated by bones up to 5 cm in length. Although extreme fragmentation is a common feature across the site and at almost all periods, the generally good preservation of the bones in this particular assemblage sets them apart. It is obvious that these particular bones had been intentionally broken and their fragmentation is not the result of trampling, poor preservation etc. It is interesting that several of the non-identifiable fragments, ribs and long bones, bear chopping marks which resulted in their fragmentation (*Fig. 6*) thus indicating that the cutting up of the animal's carcasses is at least partly responsible for the high fragmentation of the assemblage.

Gnawing marks, resulting from the action of scavengers, such as dogs, are present but scarce (*Table 18*). This is an indication, that although scavengers were present at the sanctuary precinct, they didn't have free access to these particular remains. Burning, however, is quite common (*Table 18*). About 5% of the identifiable bones and almost 10% of the non-identifiable ones are burned. Almost all are burned light brown uniformly, on spots or on one side only. Calcified bones (i.e. bones burned white) are very scarce and the few black-burned bones are only found among the non-identifiable minute bone splinters. Considering that burning in general is so light or partial, implying exposure to relatively low temperatures,[76] we could assume that burning was not an important destructive factor and bones had not been extensively thrown in the fire as a means of refuse disposal.[77] Furthermore, none of the burning marks observed is compatible to those created when meat is cooked on a spit or open fire.[78]

[76] Shipman *et al.* 1984.
[77] See relevant discussion in Early Iron Age section.
[78] Buikstra & Swegle 1989, 252; Dibble 2017, 175–177.

On the basis of the above observations, it could be argued that the animal remains that were deposited in the triangular area west of Building D had been rapidly accumulated and buried.[79] The bones did not remain exposed, either to weathering or to scavengers, as would be the case of a gradually accumulated refuse heap, nor did they suffer any trampling or moving around, as evidenced by their sharp breakage lines and the pristine preservation even of the small fragile fish elements. The pottery from this deposit has a similar preservation condition, characterized by clean, unworn breakages.

Fig. 6. Rib fragments of medium-size mammals with chop marks—D003, str. 2, BL. 19. Arrows indicate the position of cut marks. Photograph by C. Mauzy modified by D. Mylona.

Analysis of the mammal bone assemblage

The mammal bone assemblage from the deposit that was contained within the triangular area west of Building D consists of the remains of a range of taxa, which in order of relative abundance are ovicaprids, with goats being almost twice as many as sheep, pigs, and cattle (*Table 17*). One bone of an indeterminate equid and one of a deer complete the picture. The deer remain is a worn antler fragment. Its preservation state clearly places it apart from the rest of the bones. It is perhaps a stray find, which is not related to the processes that resulted in the accumulation of the rest of the animal remains.[80] The single equid bone is an astragalus burned light brown. No accurate identification has been possible due to its fragmented state. The total lack of any other identifiable equid bones makes its interpretation in this context somewhat problematic.

The sheep and goats

The remains of ovicaprids dominate the assemblage, with goats being more common than sheep. It seems that the remains of at least 13 animals are represented in this particular deposit (*Table 17*). The sexing record is inconclusive, because the sex-determining bones are very few. The dental record, consisting mostly of loose teeth, renders ageing by necessity broad (*Table 20).* Most of the teeth are of young animals (1–2 years old) or animals at their prime (2–4 years old). Older animals are few and there is only one record of a senile individual. No remains of newborn or very young ovicaprid individuals have been found. The epiphyseal fusion record supports this picture. According to these data, as they are presented in *Table 21*, only one individual had been slaughtered at an age younger than 1–1½ years old. Furthermore, two bones are from animals which lived longer than 3–3½ years of age. A light scatter of bones which appear to be from young individuals but their age at death can not be determined more accurately apparently belonged to these animals.

The anatomical part representation (*Table 22*) is fairly interesting as it shows that almost all parts of the sheep and goat carcasses, apart from those of the distal extremities (phalanges, carpals, tarsals), are represented by a high number of bones. Very few of those bones have been found despite the careful collection and the water-floating of large amounts of soil.[81] It seems plausible that the absence of these bones is connected to factors other than the taphonomic. It has been ethnographically observed that the bones of the distal extremities are those which are removed from the carcass, along with the hide.[82] Perhaps this is the reason they are absent from our assemblage. Cranial bones are also very few. The large number of loose teeth and mandibular fragments show however, that the mandibles were there, despite the absence of the rest of the skull. The relative scarcity of scapulae and pelvises is also worth mentioning. These are flat, relatively large bones, which

[79] The overall homogeneity of most features of the finds in the "dining deposit" suggests that they had not been accumulated over a long period of time, in a protected location. A single depositional event or a series of similar events happening in a short period of time seem to be the most likely explanation behind the formation of this assemblage. This paper adopts the single-event scenario.

[80] This antler tine could perhaps be considered along with several sherds of Mycenean pottery and obsidian flakes/blades which are found scattered around the sanctuary and are linked to the prehistoric habitation in the area, just west of the Temple of Poseidon (see Lindblom *et al*. forthcoming).

[81] It has been shown, on the basis of controlled bone retrieval, that lack of systematic screening or water flotation leads to a considerable underrepresentation of the smaller anatomical elements such as the phalanges, carpals, and tarsals; Payne 1972.

[82] MacGregor 1985, 30.

Table 20. Area D, Hellenistic. "Dining deposit".

	Number of cases
>2–6 months old	2
15–18 months old	1
1–2 years old	15
2–4 years old	7
4–6 years old	1
> 2–4 years old	3

Sheep and goat ageing data based on teeth.

Table 21. Area D, Hellenistic. "Dining deposit".

Age of fusion	Anatomical parts	Fused	Unfused	Young
6–10 months old	Scapula Pelvis Humerus distal Radius proximal	 4		 1
1–1½ years old	1st phalanx proximal 2nd phalanx proximal	4 1	1	
1½–2½ years old	Tibia distal Metacarpal distal Metatarsal distal	2 1		1 3
2½–3 years old	Ulna Femur proximal Calcaneus	 2		1
3–3½ years old	Femur distal Humerus proximal Radius distal Tibia proximal		 2	1 1 1

Sheep and goat ageing data based on epiphyseal fusion.

Table 22. Area D, Hellenistic. "Dining deposit". Anatomical part representation.

		Equid	Cattle	Pig	Ovicaprid	Sheep	Goat	Deer	LG	MD
Front legs	Scapula			1	3					
	Humerus		2	5	14	2	2			2
	Radius		4	4	11	2			1	4
	Ulna		1	1	2					
	Metacarpal		1		8		2			
Back legs	Pelvis				3					
	Femur		1	1	10					3
	Tibia		4	8	19		3			13
	Metatarsal		1		12					
	Calcaneus			2		1	1			
	Astragalus	1	1			2	1			
Both legs	Metapodial			3	2					
	1st phalanx		4		3	2	2			
	2nd phalanx		2	1			2			1
	3rd phalanx			1		1				
	Carpal									
	Tarsal									
Head	Axis									
	Horn-core/antler		2					1		
	Mandibular condyle				2					
	Mandible			2	7					
	Maxilla			2	2					
	Mandibular tooth			8	45	1	3			
	Maxillary tooth			2	34					
Trunk	Rib indeterminate	112 from MD and 6 from LG.								
	Vertebra indeterminate	10 from MD and 3 from LG.								

bear large amounts of flesh. Fragments of them have been noticed among the non-identifiable bones. Therefore, it could be argued that their scarcity is due to their fragmentation, perhaps for cooking purposes. This fragmentation has probably rendered them invisible. A last point, regarding the anatomical part representation of the ovicaprids is that most of the rib and vertebrae fragments recorded among the non-identifiable bones (*Table 22*) are from medium-size mammals. Several of them apparently belong to sheep and goats, thus indicating that even the trunk of these animals had been consumed.

The record of cut-marks on ovicaprid bones is fairly scant (*Table 23*). Among the preserved traces, chopping marks are the most common, while knife marks are quite frequent. Finally shaving of bones occurs in two cases. Dismembering[83] seems to have been achieved both by chopping on or near the articular surface (*Fig. 7a*) and by using a knife to cut the ligaments around the articulation, thus leaving knife marks on the bone (*Fig. 7a–b*). Such traces are observed on long bones and on the bones of the trunk (vertebrae). Furthermore, chopping was used in order to break the long bones and the ribs into smaller pieces (*Figs. 6* and *8a–b*). The knife marks on the ventral side of a lumbar vertebra in particular (*Fig. 9*) shows an attempt to cut the body in two mid-length, after the viscera had been removed. The cutting motion of a knife was also used for filleting. One other trace, the shaving of a sheep's scapula blade is of uncertain purpose (*Fig. 10*). It could however serve to the

[83] This discussion is based on comparative data produced during ethnographic field work, see Binford 1981.

Table 23. Area D, Hellenistic. "Dining deposit". Cut marks.

	Chopping	Knife mark	Filleting	Shaving	Other
Cattle	1 tibia (breaking) 1 metatarsal (breaking) 1 1st phalanx (disarticulation)	1 femur (disarticulation)		1 radius	
Pig	1 tibia (disarticulation and breaking) 1 mandible (breaking)	1 scapula (disarticulation)	1 humerus (disarticulation)		
Sheep		1 radius (disarticulation)			
Goat	2 humeri (disarticulation)				
Sheep/goat	1 tibia (breaking) 1 humerus (breaking)			1 scapula	1 scapula (possibly defleshing)

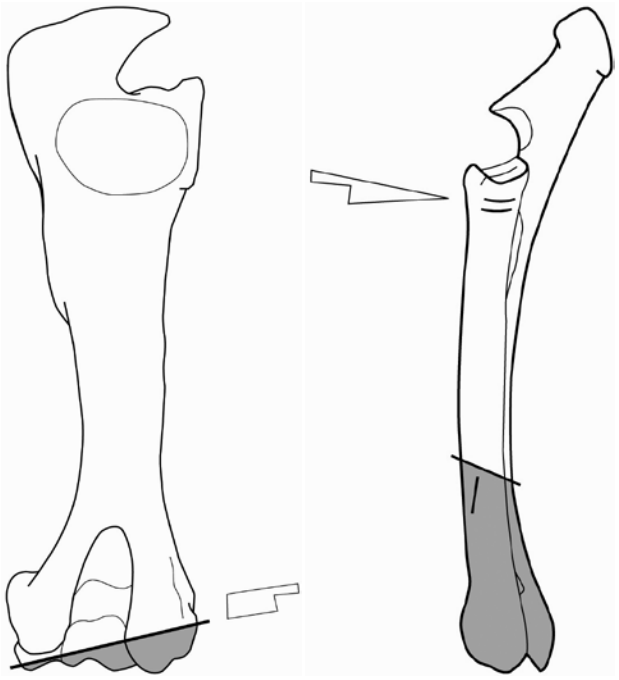

Fig. 7. Examples of disarticulation chopping marks on an ovicaprid distal humerus—D003, str. 2, BL. 19 (a) and knife marks on the proximal articulation of an ovicaprid radius—D005, str. 1, BL. 5 (b). Drawings by A. Hooton.

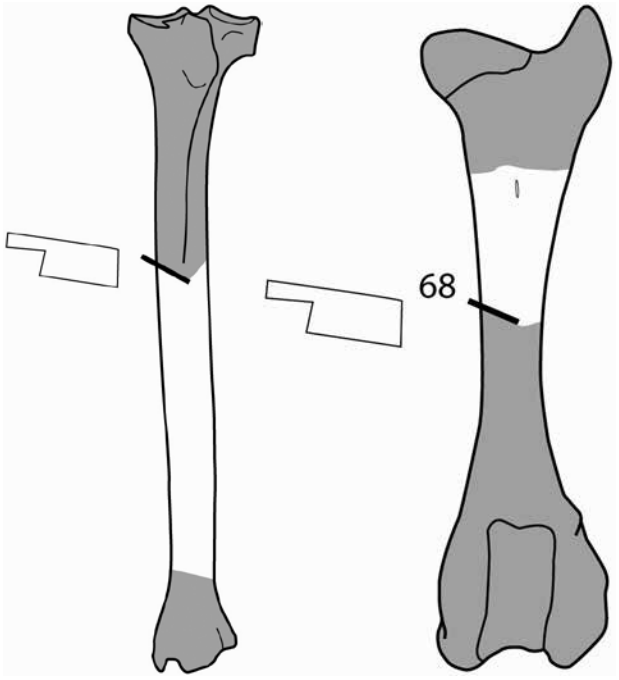

Fig. 8. Examples of chopping marks on an ovicaprid tibia—D003, str. 2, BL. 24 (a) and humerus—D003, str. 1, BL 3 shaft (b) aiming to the breaking of the bone. Drawings by A. Hooton.

removal of the flesh which covers the bone. The process of dividing the carcass into smaller portions does not always leave traces in the form of cut-marks on the bones. When small or medium-size mammals are at issue, if the knife touches the bone lightly or if the cut affects the softer parts of the bone such as the cartilage, then no visible traces will be left on the bones. Alternatively, the lighter cut-marks are often obliterated from the archaeological bones due to the erosion of the bone's surface. In the case of the sheep and goat bones from the "dining deposit", the good preservation of the remains precludes this alternative. Summing up, it seems that chopper and knife were used to cut the ovicaprid carcasses in pieces, which consisted in limb parts and parts of the rib case and the vertebral column. The chopper was further used to break the larger bones (long bones and ribs) into smaller pieces, probably in the size of individual portions.

Some of the sheep and goat bones deposited within the triangular area west of Building D are pathological. These are exclusively teeth, and show traces of a condition which is commonly called "root clubbing" (*Fig. 11*).[84] This deformation of the roots is a reaction to tooth loosening due to a variety of

[84] Richardson *et al*. 1979, 522.

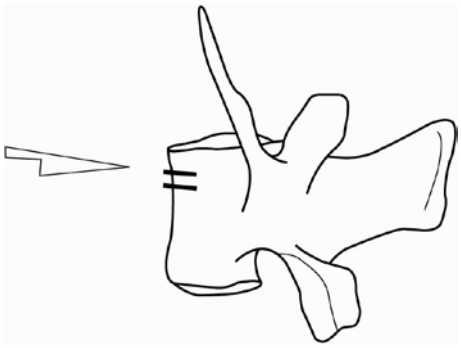

Fig. 9. Knife marks on the ventral side of an ovicaprid lumbar vertebra—D003, str. 2, BL. 14. Drawing by A. Hooton.

Fig. 11. "Root clubbing" on ovicaprid molars—D003, str. 2, BL. 16. Photograph by C. Mauzy.

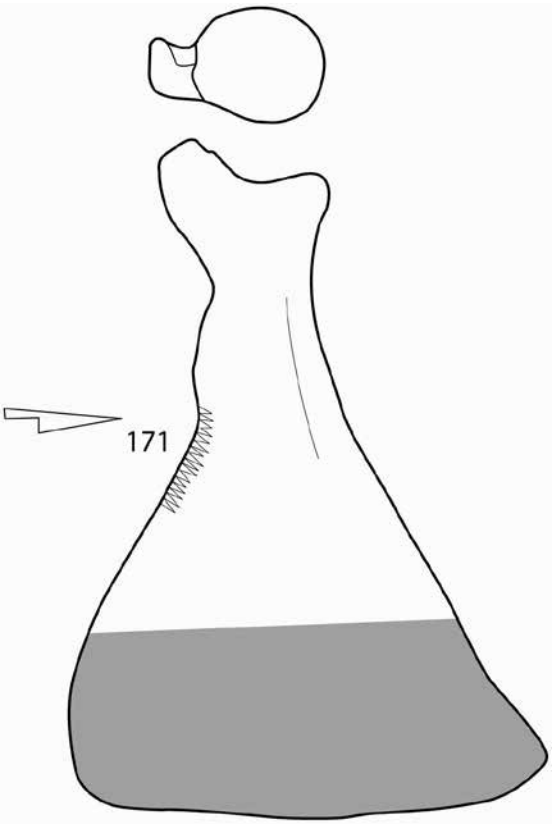

Fig. 10. Example of shaving mark on bone, probably for filleting reasons on an ovicaprid scapula—D003, str. 2, BL. 4. Drawings by A. Hooton.

reasons.[85] When a tooth becomes loose, its roots respond by expanding and acquiring the tassel-like appearance, in order to retain their stability within the mandible or maxilla. In extreme cases, the tooth loses its grip in its socket and falls out. This type of root deformity is clearly observed in the ovicaprid teeth from the dining assemblage. Seven mandibular and 13 maxillary teeth are deformed. One of them can be attributed to a goat, while the rest are indeterminate. These teeth originate from at least four individuals, possibly more. The effect of such a periodontal disease to the animal is the deterioration of its physical well-being. Difficulties in feeding may result in loss of weight and reduced resilience to maladies. Animals affected by such periodontal problems are quite common nowadays among sheep and goat herds in Greece, and although the condition is not desirable it is accepted and the animals are kept for as long as possible.[86]

The pigs and cattle

Pig remains are fairly common in the assemblage, even though both the number of bones (41) and the number of animals represented (3) are much lower than the ovicaprids (*Table 17*). The pattern of body part representation for pigs is similar to that observed for the ovicaprids (*Table 22)*. Most of the pig bones originate from fairly young individuals. The dental record (*Table 24*), albeit scant, emphasizes the slaughter of the piglets and indicates a small but steady representation of several age classes up to the age of almost one and a half years. The epiphyseal fusion record shows a heavy representation of newborn (or foetal) pigs and a lighter scatter of animals slaughtered at various stages in their life, between the first and the third year (*Table 25*). The piglet remains belong to one or two individuals and they appear to be over-represented in the assemblage. This is perhaps a result of the way their carcasses had been handled. Cut marks on the pig bones (*Table 23*) indicate the carcasses were disarticulated using a chopper to cut through the articulations (*Fig. 12a)* or a knife to cut the ligaments around them (*Fig. 9b*). The chopper was also used to break the bones in smaller pieces, just as in the case of the ovicaprids, and the knife was used for filleting (*Fig. 12b*). In the case of pig the breaking refers not only to the long

[85] Baker & Brothwell 1980, 151, 153; Miles & Grigson 1990, 560–561; Hillson 1990, 129–136.
[86] Author, pers. obs.

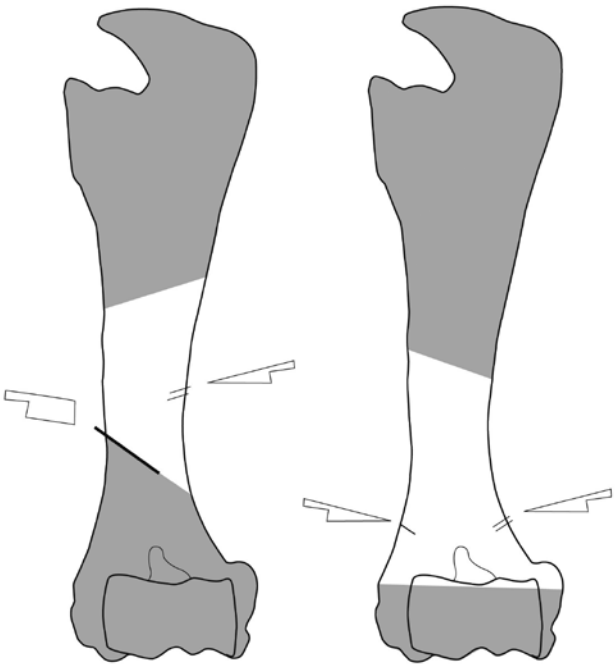

Fig. 12. Examples of chopping marks (a) and disarticulation knife marks on pig humeri (b)—D003, str. 2, BL. 14. Drawing by A. Hooton.

bones but also to a mandible (*Fig. 13*). Chopping marks have been observed on the lingual side of the mandible indicating an attempt to break it into two pieces after the removal of the tongue. No cut marks have been located on the newborn remains. They could have been cooked whole. These piglets are the only newborn animals attested in the "dining deposit".

Cattle are also represented by a variety of bones (23), which belonged to at least two animals (*Tables 17* and *22*). The cattle bone record is inconclusive regarding age and sex of the slaughtered animals, because the relevant bones are very few. One fusing 1st phalanx testifies to the slaughtering of an animal at 1–1½ year of age, while a femur fragment, light and fine, appear to belong to a very young individual, perhaps only a few weeks old. The teeth wear record is scanter still, with only one mandibular molar of an animal older than 8–18 months of age. The breaking of the massive bones of the cattle had been achieved by chopping (*Table 23*, *Fig. 14a–b*). It is interesting that two unfused bovine cervical vertebrae are articulating (*Fig. 15a–b*). These were probably part of a large chunk of meat from the neck of the animal. Chop marks on the transverse processes (wings) of the vertebrae indicate the attempt to cut a segment of the neck by cutting through the strong ligaments and muscles of the neck.

Fig. 13. Pig mandible fragment with chop marks on lingual side—D003, str. 2, BL. 13. Photograph by C. Mauzy.

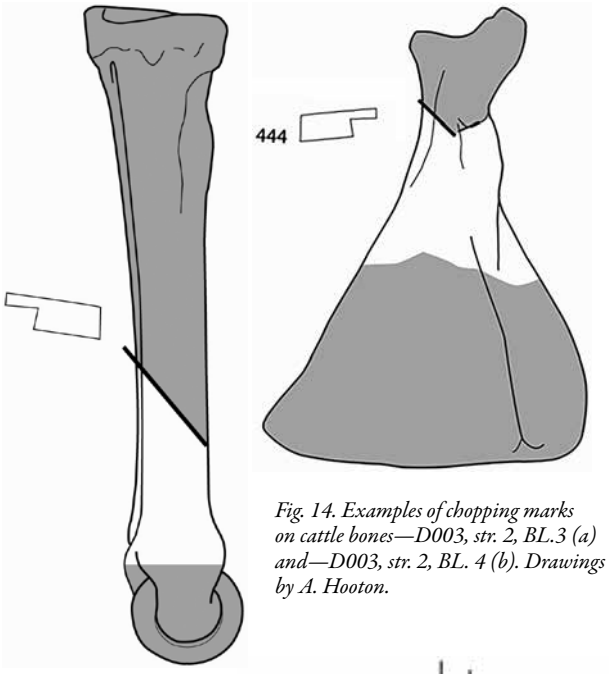

Fig. 14. Examples of chopping marks on cattle bones—D003, str. 2, BL.3 (a) and—D003, str. 2, BL. 4 (b). Drawings by A. Hooton.

Fig. 15. Articulating bovine cervical vertebrae, dorsal (a) and lateral (b) side. Chop marks visible on lateral side 0—D003, str. 2, BL. 26. Photograph by C. Mauzy.

Table 24. Area D, Hellenistic. "Dining deposit". Pig ageing data based on teeth.

	Number of cases*
Newborn	8
4–6 months old	2
>4–6 months old	1
12–17 months old	1
>12–17 months old	1

**This figure is based on the number of individual loose mandibular teeth or mandibles.*

Analysis of the fish bone assemblage

The fish remains from the so called "dining deposit" consist of 1,113 bones. Almost 10% of them are identifiable (*Table 26*). Preservation of the fish remains is very good. This is emphasized by the fact that not only fragile cranial bones have been preserved (especially among the non-identifiable bones) but even some fine fish-scales. The good preservation and the systematic sampling and water flotation of a large amount of soil support the idea that the fish bone assemblage has not been heavily affected by taphonomic forces. An altering factor which could have had a destructive effect on the fish bones, the scavengers,[87] was not involved in the formation of this fish bone assemblage.[88]

The fish bone assemblage from the "dining deposit" is particularly rich in taxa, especially compared with fish assemblages from other periods/contexts (*Table 27*). At least 18 different species of fish, and probably more,[89] were consumed. Among those, very few were small fish (<15 cm in length) and those are either picarels and sea breams (Sparidae) or small combers (Serranidae). These are the small fry caught in very shallow waters near the shore (*Tables 26* and *27*). Most of the fish remains originate from medium-size specimens (15–30 cm in length) and they are mostly sea breams (Sparidae). The common sea bream and the gilt-head sea bream are those which could be identified with certainty. However, other types of sea breams had been eaten as well, but their remains cannot be further identified. Groupers (*Epinephelus* sp.) and combers (Serranidae) of medium size were also eaten along with one meager (Sciaenidae), one wrasse (*Labrus* sp.), one weaver (Trachinidae), one scorpion fish (Scorpaenidae), one very large picarel (Sparidae), and some more fish which could not be accurately identified. It is interesting that most of the fish are species which could grow to even larger sizes. Their young age, which is reflected in their relatively small size, might be an indication that the fish had been caught near the shore[90] or alternatively might speak of intensively fished waters.[91]

Table 25. Area D, Hellenistic. "Dining deposit". Pig ageing data based on epiphyseal fusion data.

Age of fusion	Anatomical parts	Fused	Unfused	New-born
0–1 year old	Scapula	1		
	Pelvis			
	Humerus distal			1
	Radius proximal			
	2nd phalanx proximal		1	
1–2 years old	1st phalanx proximal			
	Metacarpal distal		1	2
	Tibia distal		1	
2–2½ years old	Metatarsal distal			2
	Calcaneus		1	2
3½ years old	Humerus proximal			1
	Radius distal		1	1
	Ulna			2
	Femur proximal			1
	Femur distal			1
	Tibia proximal			

An almost equally large number of remains belong to large individuals (>30 cm in length). This category of remains is the most varied. Thirteen of the 47 specimens are from large migratory species. Some of them are from tunas about 1.3–1.5 m in length[92] (*Fig. 16*), one is from a little tunny (*Euthynnus alleteteratus*), some are from indeterminate Scombridae, one is from a swordfish (*Xiphias gladius*), and two from an amber jack (*Seriola dumerili*).[93] Another category of remains of large fish includes bones of euryaline fish which inhabit brackish and fresh waters, such as estuaries and rivers. One eel (*Anguilla anguilla*) and two grey mullet (*Mugil cephalus*) bones have been identified. Finally, several of the bones in this category belong to inshore fish, which inhabit coastal shallow or medi-

[87] Jones 1986.

[88] See taphonomy section above.

[89] The unidentified remains, or those identified to genus or family level could potentially belong to species other than the ones that have been clearly identified.

[90] Wheeler & Jones 1989, 163. The shallow waters near the shore are the spawning and growing grounds for a variety of fish species.

[91] Haedrich & Barnes 1997; Højte 2005, 140.

[92] Exact identification of the species (*Thunnus thynnus* or *Thunnus alalunga*) has not been possible, but given the biology and ethology of the two species, it is most likely that the vertebrae here belong bluefin tuna (*Thunnus thynnus*) (Mylona forthcoming). The estimation of the live fish size is based on comparison of the vertebrae size to the reference specimens and to similar estimations by Rose 1994, 336. The tuna vertebrae lengths from the "dining deposit" are the following: anterior thoracic: 2.22+, 1.6; caudal: 2.41+, 2.26, 2.52 cm.

[93] The bones of the large migratory fish are over-represented in the assemblage. Almost all of them were hand-collected during the excavation from the whole of the deposit. The rest of the fish remains, however, were collected from water-floated soil samples, which amount to only 171 litres. This amount represents only a small fraction of the whole deposit. Had all the soil content of the deposit been water-floated, thus ensuring a more balanced representation, then we would expect the migratory fish to form a smaller fraction of the assemblage.

Table 26. Area D, Hellenistic. "Dining deposit". Fish taxonomic and body size representation.

	SM	MD	LG	Total
Scombridae			3	3
Thynnus sp.			6	6
Euthynnus aleteratus			1	1
Xiphias gladius			1	3
Seriola dumerili			2	2
Migratory total	**(0)**	**(0)**	**(13)**	**(15)**
Anguilla anguilla			1	1
Mugillidae			2	2
Brackish waters fish	**(0)**	**(0)**	**(3)**	**(3)**
Sparidae	4	26	4	34
Dentex dentex			4	4
Pagrus pagrus		1		1
Sparus aurata		1		1
Pagellus erythrinus			1	1
Pagellus sp.		4	1	5
Sparidae total	**(4)**	**(32)**	**(10)**	**(46)**
Serranidae	5	2	1	8
Epinephelus sp.		2	9	11
Serranidae total	**(5)**	**(4)**	**(10)**	**(19)**
Muraenidae/Congridae			1	1
Sciaenidae		1		1
Maena sp.	2			2
Sparidae	5	1		6
Labrus sp.		1		1
Trachinidae		1		1
Scorpaenidae		1	2	3
Inshore various	**(7)**	**(5)**	**(3)**	**(15)**
Indeterminate large-size			6	6
Indeterminate medium-size		6		6
Indeterminate small-size	3			3
Indeterminate total	**(3)**	**(6)**	**(6)**	**(15)**
Total identifiable	**19**	**47**	**45**	**111**
Non-identifiable				**1,002**
Total				**1,113**

Fig. 16. Tuna (Thunnus thynnus) vertebrae—D003, str. 2, BL. 16. Photograph by C. Mauzy.

Table 27. Area D and C. Fish taxonomic representation.

	EIA I–II	A I	A II	C I	Hellenistic	H I "dining deposit"	H II fill of cistern (Feature 03)	H II various	Building C all	Area C, recent/mixed
Sardina pilchardis							1			
Anguilla anguilla	1					1				
Muraenidae/Congridae						1				
Serranidae	1					8	1			
Serranus scriba	1									
Epinephelus sp.	1	1				11				
Carangidae						2				
Sciaenidae			1			1				
Sparidae	6	2		1	1	34	3	3		
Dentex dentex						4				
Pagrus pagrus						1		1		
Sparus aurata						1				
Lithognathus mormyris	1									
Boops boops							2			
Pagellus erythrinus						1	1			
Pagellus sp.						5				
Maena sp.						2				
Sparidae		1	1	1		6				
Chromis chromis	1									
Labrus sp.						1				
Sparisoma cretense							1			
Trachinidae				1		1				
Scombridae						3				
Thynnus sp.						6				
Euthynnus aleteratus						1				
Sarda sarda										1
Xiphias gladius						1				
Mugillidae						2				
Scorpaenidae			2			3				
Indeterminate small-size	2		1			3		1	1	1
Indeterminate medium-size		3				6				
Indeterminate large-size	1					6	2	1		
Total identifiable	15	7	4	3	1	111	11	6	1	2
Non-identifiable	30	7	6	3		1,002	24	3		1
Total	**45**	**14**	**10**	**6**	**1**	**1,113**	**35**	**9**	**1**	**3**

Table 28. Area D, Hellenistic. "Dining deposit". Fish anatomical part representation.

		Migratory	Euryaline	Sparidae	Serranidae	Inshore various	Indeterminate
Neurocranium	Vomer				1	1	
	Otolith		1	4		3	
Jaw related bones and branchial skeleton	Articular				2		
	Premaxilla			2			
	Quadratum				1		
	Hyomandibular			1			
	Postemporal				1		
	Opercular					2	
	Pharyngeal bones			1	4	1	
	Teeth			1	1		
Pectoral and pelvic fin skeleton	Anterior abdominal Scapula	2		5 1	2	1	2
Vertebral column	Posterior abdominal			8	1	3	
	Caudal	8		23	6	2	5
	Indeterminate	3	2			2	8
Total		**13**	**3**	**46**	**19**	**15**	**15**

Table 29. Area D, Hellenistic. "Dining deposit". Fish bone burning pattern.

Epinephelus sp.	2	Quadratum, articular
Sparidae	1	Caudal vertebra
Pagellus sp.	1	Caudal vertebra
Scorpaenidae	2	Opercular
Mugillidae	1	Indeterminate vertebra
Scombridae	1	Caudal vertebra
Thynnus sp.	1	Anterior abdominal vertebra
Non-identifiable	20	Mostly spines and ribs
Total	**29**	

um-deep waters. Many of the remains in the large fish category are from sea breams (Sparidae). There have been identified the common dentex (*Dentex dentex*), the pandora (*Pagellus erythrinus*), and some indeterminate Sparidae. Several of the large fish remains belong to groupers (*Epinephelus* sp.), two of them to the scorpion fish (Scorpaenidae), and one to either a conger eel or a moray (Congridae/Muraenidae). There are also several bones which could not be identified to species.

All the fish represented in the assemblage, apart from the migratory, have been brought to the site and consumed whole. This becomes evident by the fact that all parts of their skeleton are represented among the fish bones found (*Table 28*). The migratory species, on the contrary, are only represented by vertebrae. No head bones or pectoral and pelvic bones have been located. This discrepancy in the anatomical part representation between the different groups of fish is perhaps an indication that the seasonal large fish were brought to the site already processed to some degree, certainly beheaded, and perhaps already cut in slices or chunks. It is also possible that they were even preserved in some way. Beheading of this type of fish in an early stage after their catch is quite commonly attested ethnographically.[94] The high blood content of the fish makes the viscera and the head spoil easily, and their early removal ensures the preserving of the flesh for longer. It is interesting that the inshore fish, even the largest of them, which had a size similar to that of some of the migratory fish, were brought on site whole (e.g. groupers).

No cut marks have been observed on any of the fish bones. Chewing/crushing is almost absent as well. Only one vertebra of a small picarel or sea bream shows such a trace. Burning traces on the other hand are more common. Twenty bones, which represent about 18% of the identified fish remains and 20 non-identifiable ones are burned (*Table 29*). Most of them are burned uniformly brown. They are from large individuals, from a grouper, a grey mullet, a scorpion fish, a tuna, and from sea breams and an indeterminate Scombrid. The burned bones are both vertebrae and head bones.

A synopsis of the microfaunal remains, the bird bones, and the sea-shells[95]

The "dining deposit" produced 14 small mammal remains. Among them, only the rock mouse (*Apodemus mystacinus*) has been identified with some certainty. The small mammals are represented by both cranial and postcranial elements. Three of the indeterminate micromammal remains are burned black. This deposit also included six bird bones, which belong to two domestic fowl and a small indeterminate bird. The range of animal remains from the "dining deposit" is completed with the sea-shells. These represent 18 molluscan taxa, both bivalves and gastropods. The majority of these remains however originate from a narrow range of taxa, namely the limpets, the top shells, and the purple shells.[96] The warty venus appears also to have been significant. One interesting feature of the

[94] Vafeiadou 1974, 178; Lampadaridis 1973, 117.

[95] The materials are discussed in detail in their respective articles (Lymberakis & Iliopoulos 2019; Serjeantson 2019; Syrides 2019). Here they are presented in a synoptic manner in order to provide a full overview of the animal remains in the "dining deposit".

[96] In each of the "limpets" and "purple shellfish" groups, more than one species are represented (limpets: *Patella caerulea*, *P. rustica*; purple shells: *Bolinus brandaris, Hexaplex trunculus)* but because they occupy the same habitat and look very much alike, here we consider them as uniform groups.

top shells is that several of them have their tips broken off,[97] a feature which is apparently connected to their consumption.

Discussion

It appears that the mammal and fish contents of the "dining deposit" (along with the other organic remains) represent one dining episode of large scale, the remains of which were buried shortly afterwards in this specially formed triangular space. This dining event involved the consumption of a large amount of food or terrestrial and marine origin.

The "typical sacrificial animals",[98] among the mammals, are represented by the remains of at least two cattle, three pigs and ten ovicaprids. Among those, goats are almost twice as many as sheep. One of the cattle was a very young calf, and the second individual was also relatively young. This feature diverges both from the expected and the observed pattern in other sanctuaries,[99] where older animals seem to have been consumed. A few archaeological cases however appear to be similar to Kalaureia. Such is the case of the Temple of Aphrodite at Miletus where cattle had been slaughtered at an age between 6 months and 2½ years.[100] Among the pigs, two of the three individuals are newborns. Unlike the cattle, the use of newborn pigs in cult was quite common in antiquity.[101] The written sources emphasize the purificatory function of piglets, but in that case the animals were not eaten, but were disposed of along with the miasma they were supposed to have removed.[102] At the same time a number of inscriptions specify the use of piglets for sacrifice.[103] The sheep and goats that ended up in the "dining deposit" were animals at their prime; most of them between their first and fourth year, in other words in the most productive stage in their life, whether they were bred for meat, milk, or wool.[104] No younger animals have been found and there is evidence of the slaughtering of one senile individual only.

All animals are represented by a variety of anatomical parts. It is certain that the animal remains at hand do not represent whole carcasses even though almost all anatomical parts are present. Furthermore, no articulating bones have been located, which would indicate the deposition of whole chunks of the carcass in the triangular area. Exception to this is a part of a bovine's neck, which is represented by two consequent cervical vertebrae. Furthermore, the cut marks record show a systematic attempt not only to disarticulation but also to breaking of the bones into smaller pieces. It seems that, as was the case with the pottery,[105] here we have an accumulation of an assortment of remains which had been brought in a loose form from the consumption area elsewhere.

No distinct burning patterns associated with chargrilling have been observed on the animal bones from the "dining deposit". This would be the burning of the end of the bone, which, during grilling had been exposed to the fire, in contrast to the rest of the bone which was protected, covered by flesh. Such patterns have occasionally been observed in sanctuary bone assemblages.[106] Here, all burned bones are either uniformly burned light brown, or are burned brown and black in spots or on one side only. This pattern is consistent with the exposure of the bone to fire, probably the dying charcoal of a hearth, after the consumption of meat. This would explain the burning in spots (where charcoal was touching the bone) or on one side only (the side lying on the live charcoal). So, burning observed in the mammal bones in the "dining deposit" is probably associated with refuse disposal at the end of the meal and not to cooking. By contrast the association of the bones with a large number of cooking pots of various types indicate that the meat dishes were either boiled or stewed.

It is interesting that despite the fragmented state of the bones and of the original skeletons, the assemblage does not exhibit any conspicuous absence of certain anatomical parts, which might have been related to sacrificial ritual. Such parts are the thigh bones for example, which were often designated as the "god's share" of the sacrificial animals or alternatively the priest's share,[107] or the left or right side of the animal which was on some occasions prescribed as the desired sacrificial part.[108] The observed absence of the distal leg bones of pigs and ovicaprids could be interpreted as a result of the skinning of the animals and the removal of the hides elsewhere.[109] No distinct pattern related to left or right side over-representation, such as the one recorded in other sanctuaries,[110] has been observed.

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[97] Syrides 2019.

[98] Cattle, pigs, sheep and goats are here called "typical sacrificial animals" because they are the ones typically referred to in sacrificial calendars (e.g. Rosivach 1994).

[99] At the Hellenistic strata of Temple C at Kommos cattle were slaughtered after the completion of their first year and often older than this (Reese & Ruscillo 2000, 476, table 6.6) and at the Sanctuary of Poseidon on Tenos at an age over 3 years (Leguilloux 1999, 123); for the economics of the preferred age of slaughter of cattle, Jameson 1988, 93–103.

[100] Peters 1993, 90.

[101] Jameson 1988, 98; see also Clinton 2005, 168.

[102] Parker 1983, 283, n. 11; Clinton 2005.

[103] For piglets in Greek cult, Forstenpointner 2003; Ekroth 2002, 158–169.

[104] Payne 1973; Jameson 1988, 99–103; Rosivach 1994, 148–153.

[105] Wells *et al.* 2005, 169.

[106] For this phenomenon at the Artemision, Ephesos, Hägg 1998, 52 and references therein; for other types of burning see MacKinnon 2013, 133–136.

[107] Ekroth 2008, 262–263, 268 and references therein. MacKinnon 2013, 135–137.

[108] MacKinnon 2013.

[109] For the selling of the hides from sacrificial animals, Jameson 1988, 107–112; for a similar trend observed among cultic animal bone assemblages at Nemea, MacKinnon 2013; for zooarchaeological evidence on skinning MacGregor 1985, 30.

[110] MacKinnon 2013.

Some of the consumed sheep and goats were suffering a periodontal pathological condition, which would have resulted in the animal's physical weakening. Remains of animals of poor condition are found in various excavations, but presence in the context of a sanctuary poses an interesting problem concerning our assumptions about the mechanisms of meat acquisition and consumption in Classical Greece.[111] There is a common assumption that all red meat consumed in a cultic context had to have originated from a sacrifice and one of the prime general rules of sacrifice is thought to be that animals had to be unblemished and physically perfect.[112] It has been assumed though, on the basis of scant literary evidence, that the rule of perfection for sacrificial animals may have been flexible. We do not know what the ancient Greeks' perfection standards were, and we may assume that in dire conditions the sacrifice of even an ill animal might be considered better than no sacrifice at all.[113] In our case we may have the evidence of just such a tolerance to physical imperfection. Alternatively, we might be dealing with a different situation altogether. We could imagine, that in a case of large-scale sacrifice of many animals, perhaps one or a few perfect ones were formally sacrificed in the standard dramatic way as a *pars pro toto,* while the rest of the animals required for the worshipper's dining were summarily slaughtered with no consideration of their physical condition.

In conclusion, we are in a position to infer from the animal bones that the menu of the dining event that resulted in the accumulation of the deposit under study partly consisted of red meat from sheep and goats, cattle, and pig. The meat had been either boiled or stewed after having been cut in portion-size pieces. We are not in a position to know whether the soft boneless parts of these animals were consumed as well, as they leave no macroscopic traces. The origin of the meat also remains enigmatic. It may be considered as certain, however, that we are not dealing with animals from which a certain part, such as their thighs and tail, had been set apart as the god's portion or the priests' share. It seems that all bone-bearing parts of the animals' carcasses were consumed by the participants in the dining event being what Gunnel Ekroth calls "sacred" meat (as opposed to "sacrificial" meat).[114]

The "marine meals"[115]

Among the non-typical sacrificial animals in the assemblage fish predominate. There are also numerous remains of sea shellfish, among which the edible limpets, top shells, ceriths, and purple shells are the most common.[116] What characterizes the assemblage of fish remains from the "dining deposit" is the variety of taxa and fish sizes. At least 18 different fish taxa range in size from over a metre long for tunas to about 15 cm for the picarel, the combers, and some sea breams. In this assemblage we find remains of almost all taxa identified in the sanctuary as a whole. The sea-shell record is not as varied. In that case we discern a focused collection of shellfish.

All inshore and euryaline fish were apparently brought to the sanctuary and consumed whole. The large migratory fish on the other hand were probably cut in slices and brought to the sanctuary in this form. Again, as in the case of the mammal bones, there are no burning traces compatible with cooking on the spit. Although burning is quite common, only the largest of the fish bones are burned, and those are mostly burned brown. We could suggest that these chunky bones had been collected and thrown in the dying fire of a hearth along with the mammal bones. Not much evidence on the way fish had been cooked is provided by the osteological material. A single bone of a picarel appears to have been chewed. Eating small fish whole, as common a practice today as it apparently was in the past, may account for the relatively low number of bones of the smaller fish in the assemblage. Stewing or boiling of the fish appears to be the way the fish in the "dining deposit" was prepared. Written sources preserve the term *epsetos* to denote boiled fish.[117] The abundance in the deposit of a variety of cooking pots, of various sizes, is perhaps compatible with such a suggestion.[118]

The role of fish in cult has until recently been underestimated. Reference to fish sacrifice in written sources is quite scarce.[119] An idiosyncratic case of eel sacrifice by the Boetians to the Unknown Deities was attributed to an ancestral custom, apparently peripheral to current practice in the 2nd cen-

[111] For a systematic categorization of various categories of meat within sanctuary context, Ekroth 2007.

[112] Stengel 1910, 197–202; Ziehen 1939, 589; Jameson 1988, 87. For different terms that describe the physical perfection of the sacrificial victim see Lupu 2005, 129, 356. For different interpretations of the term *teleion* (of a certain age) see Ziehen 1939, 595, 597; Lupu 2005, 129.

[113] Jameson 1988, 87.

[114] Ekroth 2007, 269.

[115] The term "marine meal" was introduced to describe concentrations of fish bones and sea-shells found in certain deposits, near hearths or altars in the publication of the Iron Age sanctuaries at Kommos, Crete (Shaw 2000, 683; Reese 2000, 629 and various lines in table 6.1; Rose 2000, various lines in table 2.28). The information in this subchapter has been previously presented in Mylona 2008, 91–99.

[116] Syrides 2019.

[117] LSJ, s.v. *epsetos.*

[118] Wells *et al.* 2005, 164–179; 2006–2007, 72–73.

[119] For the unsuitability of fish for sacrifice, Detienne 1989a, 221, n. 8; Wilkins 1993, 191–193. The literature on fish-eating in a secular context is very broad. For a comprehensive discussion on the issue Mylona 2008, 99–102; for the possible association of the fish sacrifice to the spread of the Atargatis cult in Greece, Novaro-Lefèvre 2010.

tury BC.[120] Similarly the sacrifice to Poseidon of the first tuna caught every season at the deme of Halae Aexonidae in Attica, in a special rite called *thynnaion,* also has the flavour of an unusual practice in the 4th century BC Athens.[121] Fish offerings in the form of artefacts such as fish miniatures, figurines, or engraved metal plates were on the contrary fairly common,[122] as was apparently the dedication of cooked fish and actual fishing gear by old retired fishermen to certain gods. Such fishing implements, fish-hooks, net-weights, netting needles etc. have been found in sanctuaries and Greek epigrams of various dates poetically emphasize the widespread and diachronic nature of such gestures.[123] Various fish-hooks and lead net-weights that have been recovered throughout the sanctuary, many of which date to the Hellenistic times,[124] could be just such offerings.

Zooarchaeological work in various sanctuary sites[125] reveals a situation in which fish were more actively used in cult processes than just as small offerings. A review of these finds, a discussion of relevant data and their association with particular deities by Mark Rose[126] demonstrates a potentially more complex role of fish in cult than was previously accepted.

Cooking and eating of fish during the dining events within sanctuaries is the aspect of this role that can be most easily explored. At Kommos, a coastal site on southern Crete, for example, some 509 fish remains have been found in Hellenistic layers in Temple C, mostly from a floor deposit but also a few from hearths and other fills.[127] The fish bones originate from a variety of species, all coastal.[128] Most of the fish were small and medium in size, but larger fish such as large Serranidae (possibly groupers) or Elasmobranchs, i.e. cartilaginous fish, were also present.[129] All the bones, with the exception of five specimens from the interior of a hearth, are unburned[130] in contrast to the fish assemblage from the Early Iron Age Temple B, where many of the fish remains, especially those found in association with altars, had been burned. According to Rose, the fish remains from Temple C probably represent dining refuse.[131]

A second clear case of fish consumption in the context of dining in a sanctuary is that from the Sanctuary of Demeter and Kore at Corinth.[132] The excavation of two Classical dining rooms has produced, among other finds, 49 fish bones (but almost no sea shellfish).[133] They all belong to very small sea breams (11–15 cm in length). The assemblage consists of both cranial and postcranial elements. According to Lyn Snyder who analysed the assemblage, these small fish may have been prepared by boiling or frying or they might have been part of a fish sauce.[134] The fish were part of a menu that also included pig, sheep and/or goats, and various plant foods, such as grains, pulses, and fruits.[135] Fish bones have been found in various sanctuaries but because of the field methodologies applied their numbers are very low and they are not very helpful in illuminating the possible "marine menus" in these sanctuaries.[136]

Evidence for the inclusion of fish in sacred menus, in formal dining events taking place in a sanctuary as part of cultic activities, is provided by the inscriptions from Delos, dating to the first decades of the 2nd century BC that were discussed earlier.[137] When women were celebrating the festival of Eileithyia, provisions were made for the purchasing of some type of preserved fish, among other food items, which included mutton, cheese, sesame, honey, vegetables, walnuts, and wine.

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[120] This information is preserved by the 2nd-century BC historian, Agatharchides from Knidos, in his "European Affairs" (FHG III, 192 and in Ath. *Deip*. 297d). A discussion of this case in Mylona 2008, 83–84, 97.

[121] The case is referred to by Antigonus of Carystos', mid-3rd century-BC comedy play entitled "The Net" (in Ath. *Deip*. 297d); for discussion of the case, see Bevan 1986, 131; Burkert 1983, 208–209; Simoons 1994 (1961), 275; Rose 2000, 525; Mylona 2008, 61, 97.

[122] Bevan 1986, 133f.

[123] Epigrams of various dates refer to this custom (e.g. Apollonides, *Anth. Pal.* 6.105; Anonymus *Anth. Pal*. 6.23). Fishing gear found in sanctuaries are the material testimonies of such dedications (e.g. Deonna 1938, 200; Gebhard 1998, 108; for Olympia Baitinger & Völling 2007, 1–7, 57–66; several cases in Mylona 2008, App. 3).

[124] For dedication of fishing implements at Kalaureia, Penttinen *et al.* 2009, 111, 132, fig. 26; Mylona 2015.

[125] Mylona 2003; 2008.

[126] Rose 2000.

[127] Rose 2000, table 6.23, 556–559.

[128] Exception to this is the single bone of a catfish (*Clarias gariepinus*), a freshwater fish imported from either Syria-Phoenicia or Egypt; Rose 2000, table 6.14, 499, 498–506.

[129] The size of the fish has been inferred from information presented in Rose 2000, table 6.23. The fish bones have been retrieved by hand collection and water flotation.

[130] Rose 2000, 536–537.

[131] This conclusion has been reached after comparing the Temple C fish remains with both the clearly cultic Temple B assemblage and the Minoan remains of domestic character (Rose 2000, 536–537).

[132] Bookidis *et al.* 1999.

[133] For a detailed discussion of this fish bone assemblage, from which the information used here is taken, Bookidis *et al.* 1999, 38–39.

[134] Bookidis *et al.* 1999, 44.

[135] Bookidis *et al.* 1999, 32–38 for the mammal remains and 19–32 for the carbonized seeds.

[136] In the Hellenistic deposits of the Zeus Sanctuary in Pilarou Cave on Thera island were found remains of a gilt-head sea bream (*Sparus auratus*), a bluefin tuna (*Thunnus thynnus*), and some indeterminate fish bones. According to Cornelia Becker, the remains probably represent food waste (Becker 1997). Other fish remains of broadly contemporary strata have been found in the Hero and Demeter Sanctuary at Messene, Peloponnese. More specifically a bluefin tuna vertebra (*Thunnus thynnus*) has been recovered from a 3rd–2nd-century BC deposit near the temple of Artemis Orthia, and four remains of grouper (*Epinephelus* sp.) from a 2nd–1st-century BC building fill deposit south of the Asklepieion (Nobis 1994, 303). Whether the fish remains represent dining refuse or something else is uncertain because no context information or discussion of their specific associations are provided.

[137] Linders 1994.

Table 30. Area D. Various H II contexts.

	Humerus	Radius	2nd phalanx	Mandible and teeth	Other	Total
Cattle	1		1			**2**
Pig	1	1		1		**3**
Ovicaprid	1			1		**2**
Fish					9	**9**
Snake					1	**9**
Non-identifiable					207 (9 burned black/white)	**207**

Table 31. Area D. Various H II fish.

Identifiable	Non-identifiable
1 incisor, Sparidae 2 molar, Sparidae (1unerupted, 1 burned) 1 molar of common sea bream (*Pagrus pagrus*) 1 indeterminate vertebra, SM 1 indeterminate vertebrae, LG	3 non-identifiable

Fish however were not among the food articles required for the men's feasting at Poseideia, a festival in honour of Poseidon. The Eileithyia menu strongly brings to mind the tiny fish remains from the Sanctuary of Demeter and Kore at Corinth.

The marine meal found in the "dining deposit" includes a variety of shells. Inscriptions of sacred menus do not make reference to such food items, nor do we find references in the ancient literature that might connect the consumption of such items to cultic procedures. On the contrary, we do find references for limpets (λεπάς) and top shells (ληρείτης), ceriths (στρόμβος) and purple shells (πορφύρα) in medicinal literature[138] and in comedy and sympotic literature where various kinds of profane banquets are described.[139] In those banquets, sea-shells are described as appetizers.[140] The consumption of sea-shells in sanctuaries is taken for granted due to their presence in the excavated deposits. Their exact role however and their possible role as dedications remains hazy.[141]

Area D. The Late Hellenistic/Early Roman mammal and fish bones

ASSORTED H II DEPOSITS

The Late Hellenistic deposits from the general area of Building D are quite poor in bone finds. These have been collected by hand picking and by water flotation of four soil samples amounting to 100 litres of soil.

The assemblage contains bones of cattle, pig, and ovicaprids as well as remains of fish and snake (*Table 30*). The fish identified (*Table 31*) are the common sea bream (*Pagrus pagrus*), some medium-size sea breams (Sparidae), and several indeterminate bones of small fish. The bones are extremely eroded. None of the identifiable bones are burned, but there are some (nine) black/white minute fragments among the non-identifiable remains. There are also two burned fish bones. Two of the bones are cut. One ovicaprid humerus is chopped half-way across its shaft and a pig radius is also cut across at mid-shaft by knife in an action which is usually associated with filleting.

Animal remains from the cistern (Feature 03)[142]

The Archaic cistern (Feature 03) which was filled in the Early Roman times (H II) produced one of the most enigmatic zooarchaeological assemblages on site. The cistern was systematically sampled and a large portion of its soil was water floated. Hand collection and water flotation of eleven soil samples amounting to 235 litres of soil produced over 13,000 animal bones.

The list of species identified in the assemblage and the relative proportion of each taxon gives a first impression of how unusual this assemblage is (*Table 32*). This list includes donkey, cattle, pig, sheep, goat, dog, fish, birds, eggs of birds, snakes, frogs, small mammals, and large numbers of purple shells of the *Bolinus brandaris* type. Among the animal bones, the remains of dogs and snakes are the most numerous.

The animal remains have been unevenly distributed in the column that forms the cistern's fill (*Table 32*, *Fig. 17*). A concentration of remains is observed in strata 5 and 6. These are also the strata which produced thousands of purple shells[143] and large amounts of broken glass vessels.[144] Strata 11 to 18

[138] Dalby 1996, 72–75; Bélis 1999, 297–303; Voultsiadou 2010.
[139] Bélis 1999, 308–310 and relevant entries in Thompson 1947.
[140] For the proper order of sea food and various fish in a meal see Mylona 2008, 141.
[141] Detailed studies of sea-shells from sanctuaries which attempt to contextualize such finds are few, e.g. Theodoropoulou 2013.

[142] This material has been presented and extensively discussed in Mylona 2013. Here all animal remains are presented (including a summary of those published in detail elsewhere, i.e. Syrides 2019; Serjeantson 2019; Lymberakis & Iliopoulos 2019) along with a synopsis of the results of their analysis.
[143] Syrides 2019.
[144] Wells *et al.* 2006–2007, 90–94, fig. 59.

Table 32. Area D. Late Hellenistic/Early Roman. Fill of Feature 03—the cistern. Taxonomic representation by stratum.

	4	**5**	**6**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**NISP all**	**% all**
Equid			9	1	1		1					12	1.78
Cattle			1		4		1	1	1	2	1	11	1.63
Pig		1	6	1	7	1	6	1		1		24	3.56
Ovicaprid		22	19	14	6	2	4	1	1	7	2	79	11.73
Sheep		4	3			3	1				2	13	1.93
Goat		2	1	1	1							4	0.59
Dog		40	152	34	30	17	45	1	6	10	19	353	52.45
Newborn dog		14	36	20	33	9	18		1	10	10	152	22.58
Large-size mammal			4		2		1				2	9	1.33
Medium-size mammal		3	4	2	1	4					2	16	2.37
Total mammal NISP	**-**	**86**	**235**	**73**	**85**	**36**	**77**	**4**	**9**	**30**	**38**	**673**	**100**
Fish	1	6	7		3	7	9		3	7	7	51	
Bird		6	21	8	8	6	4		2			55	
Snake		540	297	13	495	367	442		47	39	480	2,720	
Frog		7	8	10	16	9	19		3	13	19	104	
Small mammal		14	21		19		21		4	5	11	95	
Non-identifiable 1–5 cm	4	181	331	79	265	48	230	4	4	8	8	1,162	
Non-identifiable 0–1 cm	-	3,000	5,000	-	876	177	1,216	10	180	680	850	11,989	

are equally rich in variety but the remains in them are mostly microfaunal or small elements of other animals.

Taking into account that the deposit in these levels consisted of a mixture of stones and soil, and the fact that most of bones in these strata are relatively small in size, it could safely be assumed that the animal remains found in the layers below stratum 6 have percolated from above over the years through cavities among the stones. The same is probably true for other categories of finds such as the glass, which is found in small fragments all the way down the column. The only case where a deliberate deposition appears to be clear is in strata 5 and 6, where we observe the largest concentration of bones and the largest size of remains.[145]

Medium- and large-size mammals (dogs excluded)

Equid, cattle, pig, and ovicaprid remains are relatively few in comparison to dog and microfaunal remains (*Table 32*). Equids are represented by a metacarpal, a metatarsal, and ten teeth, nine of which are maxillary and belong to the same individual, a donkey (*Table 33*). The tenth tooth originates from a young equid (*Fig. 18*). The set of maxillary teeth of the donkey is an unusual find, not only because they are burned, but also because they do not correspond to other cranial bones in the assemblage. So, it seems that the burned teeth of the donkey had been collected and deposited in the cistern in a loose form.

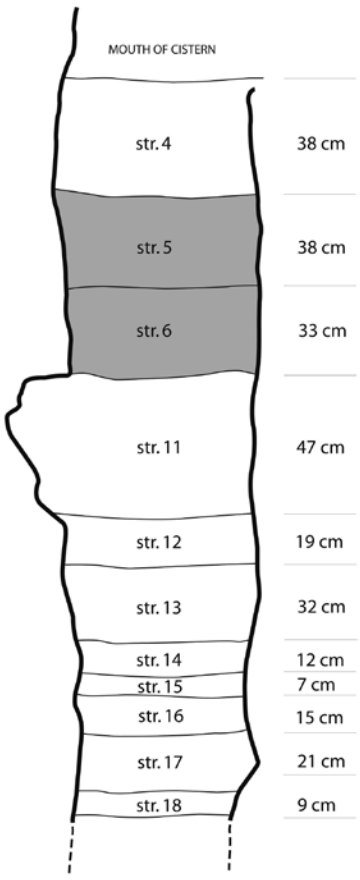


Fig. 17. Schematic section of the cistern (Feature 03).

[145] These are also the strata where remains of purple shellfish and glass vessels were the densest.

Table 34. Area D. Late Hellenistic/Early Roman. Fill of Feature 03—the cistern. Burning.

Strata	Equid	Cattle	Pig	Ovicaprid	Dog	Non-identifiable
4						3
5					1	17
6	9				9	18
11					1	
12					1	1
13						
14			1			14
15		1				
16						
17						2
18						2

Table 33. Area D. Late Hellenistic/Early Roman. Fill of Feature 03—the cistern. Mammal anatomical part representation.

	Equid	Cattle	Pig	Ovicaprid	Sheep	Goat	Medium-size mammal	Large-size mammal
Scapula			1	2	2		2	1
Humerus		1	1	1			1	2
Radius		2		5	1		1	4
Metacarpal	1	2	1	4				
Pelvis				2			1	
Femur				2			1	
Tibia				5				
Ulna			2	8				
Metatarsal	1			1	1			
Metapodial			4	5				
Calcaneus				2	1		1	
Astragalus				1		2		
1st phalanx			1	9	4		2	1
2nd phalanx		1	2	1	4	1		
3rd phalanx						1		
Mandibular condyle		1		1				
Mandible				2				
Maxilla				1				
Mandibular tooth	1	3	6	17				
Maxillary tooth	9		2	2				
MNI	2	2	1	4	1	1	1	2

Fig. 18. Milk molar of a horse—D004, str. 14, BL. 14. Photograph by C. Mauzy.

Fig. 19. Distal radius fragment of acow/bull with chop marks. Photograph by C. Mauzy.

The pigs are also represented by both mature and very young individuals and we have at least two individuals deposited in the cistern. All parts of the pig's carcasses appear to be present (*Table 33*) although no articulated parts have been located.

Cattle and ovicaprids are all adults.[146] Several anatomical parts are present, but none was excavated articulating with others. Despite the small number of bones at least one cow/bull and four ovicaprids are represented. The cistern contained the remains of at least one bovine and four ovicaprids. No sexing information is available. Burning is extremely scarce (*Table 34*). Fourteen long bone splinters from stratum 5, which are burned on one end only, possibly as a result of cooking on charcoal, could belong to ovicaprids. Cut marks are equally scarce. Cattle bones are more heavily chopped *(Fig. 19*), while ovicaprid bones bear only disarticulation knife marks. Chopping marks on non-identifiable bones are found on long bone splinters, obviously aiming to break the bone into small parts.

The cattle, pig, and ovicaprid bone assemblage from the cistern appears to be quite similar in its basic traits to the bones found in the H I "dining deposit" to the west of Building D, indicating that, these too, probably represent dining refuse. Unlike the remains of the Hellenistic "dining deposit" however, the bones from the cistern have been deposited along with other animal remains but not along with cooking and drinking pottery. It is perhaps a case of dining of a different nature/purpose.

Dogs

Among the identifiable bones, the majority (75.03%) belong to dog (*Table 32*). Of those, two major groups emerge: the adults and the newborns. The mature dogs are of various statures as it becomes evident from the different sizes of their bones (*Table 35*, *Appendix*). There are remains of at least eight adult dogs. All anatomical parts are present (*Table 37*): front and hind legs, cranial parts, trunk and thoracic cavity, pelvis

[146] Not enough dental and fusion data are available for any trends to appear.

Table 35. Area D. Late Hellenistic/Early Roman. Fill of Feature 03—the cistern. Dog bone measurements.
Bp: breadth proximal, Dp: Depth proximal, Bd: Breadth distal, Dd: Depth distal, H: Height, GLl: Greater length lateral, GLm: Greater length medial.

Bp	0.84	0.85	0.83	0.72	0.98	0.92	0.82	0.78	-	0.78	-	0.79	-	-
Dp	0.73	0.69	0.79	0.69	0.82	0.75	0.72	0.72	-	0.70	-	0.70	-	-
Bd	0.71	0.71	0.63	0.60	0.79	0.68	0.62	0.62	1.72	-	0.58	-	0.72	0.60
H	2.22	2.68	2.20	-	2.58	2.63	2.60	2.28	-	2.46	-	-	-	-

5a. 1st phalanx

Bp	0.68	0.64	0.69	0.89	0.79	0.72	0.80	0.79	-	0.72	0.79	0.78	0.72
Dp	0.58	0.45	0.52	0.78	0.64	0.62	0.62	0.63	-	-	0.70	0.60	0.62
Bd	0.62	0.61	0.62	0.80	0.72	0.66	0.69	-	-	-	0.79	0.76	0.72
H	1.59	1.08	1.02	2.16	1.72	1.83	1.21	-	1.17	-	1.40	1.78	1.80

5b. 2nd phalanx

Bp	-	-	-	-
Dp	-	-	-	-
Bd	1.90	2.29	2.32	2.50

5c. Humerus

Bp	-	-
Dp	-	-
Bd	1.37+	2.77

5d. Tibia

GLl	2.79	1.93
GLm	1.82	1.08
Bd	1.58	1.39

5e. Astragalus

Bp	1.22	1.59	1.78
H	-	3.73	-

5f. Calcaneus

and tail, but they do not consist in complete skeletons. We can assume that the mature dog remains had been deposited in the cistern as loose bones.

The newborns also come in a variety of sizes *(Fig. 20*). Because of the fragile nature of these bones, their ends were often worn and exact measurements could not be taken. As a solution to this problem a relative size scale has been devised. The smaller size bones fall within size group A, while the largest of the puppies' bones within size D group (*Table 36*). We have the remains of at least 26 puppies, probably more. In this case we do have the remains of whole carcasses, even though we found them in a disarticulated form. Not only limb bones but also all cranial elements, vertebrae, and ribs of the newborn dogs are present in the assemblage (*Fig. 21*, *Table 37*). It is obvious that these puppies originate from various litters. Although the difference in size could in some cases represent difference in the body size of the parents, the different development stage of some of the bones indicates that size difference should also be attributed to different age of the various puppies. In any case, none of the puppies is older than a few weeks of age.

Fig. 20 (right). Newborn/foetal dog humeri. Photograph by C. Mauzy.

Fig. 21 (below). Various bones of newborn/foetal dogs. Photograph by C. Mauzy.

Some of the adult dog bones are burned (*Table 34)*. Three radii are burned in spots. Three metatarsals are also burned, one of them on its distal end (*Fig. 22*). In addition, one 3rd phalanx, three mandibles and two metatarsals bear light brown burning marks. Among the non-identifiable remains several ribs, of a relatively small size, appear to be burned on their end (*Fig. 23*). These are also probably dog

Table 36. Area D. Late Hellenistic/Early Roman. Fill of Feature 03—the cistern. Size group attribution of newborn dog remains.

	Size A	Size B	Size C	Size D
Scapula	3	2	2	
Humerus	11	3	4	4
Radius	22	9	15	1
Ulna	5	4	1	1
Pelvis			3	
Femur	8	6	3	3
Tibia	5	5	1	2
Mandible				1
Maxilla	1	1		1
MNI	**11**	**5**	**8**	**2**

Table 38. Area D. Late Hellenistic/Early Roman. Fill of Feature 03—the cistern. Cut marks.

	Chopping	Disarticulation	Skinning	Other
Cattle	4	-		1
Ovicaprid	-	3		
Dog	2	1	1	
Non-identifiable	3			

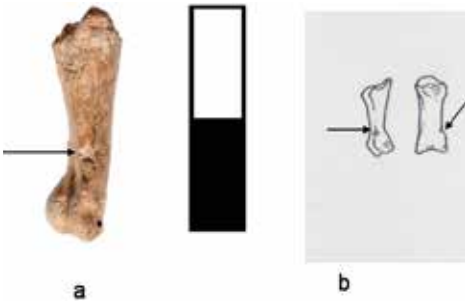
Fig. 22 (left). Dog metacarpal (Mtc I) with burning traces on the distal end. Photograph by C. Mauzy.

Fig. 23 (below). Ribs of a medium-size mammal, most probably dog. Some are partly burned. Photograph by C. Mauzy.

Fig. 24 (right). Dog 1st and 2nd phalanges with cut marks, possibly related to skinning. Photograph by C. Mauzy, drawing by A. Hooton.

Table 37. Area D. Late Hellenistic/Early Roman. Fill of Feature 03—the cistern. Dog anatomical part representation.

	Left	Right	Mature indeterminate	Newborn indeterminate
Scapula	3	3		7
Humerus	7	4	4	28
Radius	6	8	5	42
Metacarpal	1	5	6	
Pelvis		1		9
Femur	3	2	2	18
Tibia	1	1	3	12
Ulna	1			11
Metatarsal		2	3	
Metapodial			29	
Calcaneus	6	3	1	
Astragalus	3	2		
1st phalanx			8	1
2nd phalanx			4	
3rd Phalanx			3	
Tarsal			3	
Axis			1	
Sacrum			1	
Mandibular condyle	1			
Mandible	7	3	1	6
Maxilla	2	1	4	2
Mandibular tooth	9	16	36	8
Maxillary tooth	19	9	21	6
MNI	**8**			**26**



bones. Furthermore, four dog bones bear cut marks (*Table 38*). A humerus and a tibia fragment are chopped across their shaft, a radius bears disarticulation cut marks, and a 1st and 2nd phalanx and a metapodial with cut marks on them (*Fig. 24*) may indicate skinning.[147]

[147] Binford 1981; MacGregor 1985.

Table 39. Area D. Late Hellenistic/Early Roman. Fill of Feature 03—the cistern. Fish bones record.

Strata	Non-identifiable	Taxa
4	-	-
5	8	1 caudal vertebra, Sparidae, MD 1 left premaxilla, Sparidae, MD 4 spines/ribs, SM 1 flat bone, LG 1 pharyngeal tooth-bearing bone, LG
6	3	1 caudal vertebra, pandora (*Pagellus erythrinus*), MD 1 caudal vertebra, Sparidae, MD. 1 scapula of grouper (*Epinephelus* sp.), LG
11	-	-
12	1	1 opercular, SM
13	7	1 pharyngeal bone (*Sparisoma cretense)*, MD 6 non-identifiable MD and SM, 2 burned light brown
14	11	1 caudal vertebra of bogue (cf. *Boops boops*), SM 1 abdominal vertebra Clupeidae (cf. *Sardina*) 3 unidentified MD, 1 burned brown 5 non-identifiable MD, 1 burned brown 4 non-identifiable, 1 SM
15	-	-
16	3	3 spines/ribs, SM, 1 rib burned black
17	8	1 caudal vertebra Sparidae, SM 1 caudal vertebra, very SM 6 spines and flat bones, SM
18	7	1 dentary of bogue (*Boops boops*), MD, burned black 6 spines, SM

On the basis of the above observations it appears that various adult dogs were eaten after they had been skinned somewhere near the cistern. Their preparation probably involved chargrilling of portions of dog meat. After the consumption of the meat and probably the temporary deposition of the bones in a hearth, the bones and probably the skins of these dogs were deposited in the cistern. The puppies were also probably cut in pieces. They do not seem to have been chargrilled like the adults. They were either cooked in another manner (boiled, stewed) or left uncooked.

Snakes[148]

The cistern deposits produced a very large number of snake remains, with the majority concentrated in strata 5 and 6. They represent a number of different taxa and different individuals within taxa, some of them reaching a length of over 1.5 m. The Montpellier snake (*Malpolon* sp.), the Balkan whip snake (*Hierophis gemonensis*), the aquatic four-lined snake (*Elaphe quatuorlineata*), the grass snake (*Natrix natrix*) and/or the dice snake (*Natrix tesselata*), and the nose-horned Viper (*Vipera ammodytes*) are the identified taxa. These snakes are from both venomous and non-venomous varieties. A number of their remains, both vertebrae and ribs (but not cranial bones) are burned black or white (*Fig. 25*). No cut marks have been observed. It appears that various snakes were killed, cut in pieces and exposed to fire, with the flesh still on. It is possible that the snake flesh was consumed, but other uses cannot be excluded.

Fig. 25. Burned snake bones. Photograph by C. Mauzy.

Other microfauna[149]

This category includes frogs, lizards, house mice, and rats. One of the frog bones is burned black, indicating the use of the frogs, perhaps in a way similar to snakes. The rest of the microfaunal remains are all unburned.

Fish

Forty eight fish bones (13 identifiable), represent a quite varied range of taxa (*Table 39*), which includes a large grouper (*Epinephelus* sp.), a medium-size parrotfish (*Sparisoma cretense*), the sardine (*Clupeidae*), the bogue (*Boops boops*), a large pandora (*Pagellus erythrinus*), and various small and large unidentified fish. They have been found throughout the cistern's column. Some of the fish bones are burned black.

Birds[150]

Bird remains have been found in most strata of the column's fill, with greater abundance of remains in strata 6, 11, and 12. A whole crow (*Corvus* sp.), bones of chicken (*Gallus gallus*),

[148] For details on the individual snake taxa located in the cistern, their distribution in the cistern deposits, and their burning, see Lymberakis & Iliopoulos 2019.

[149] Lymberakis & Iliopoulos 2019.

[150] For details on the bird bone record and a broader discussion on their significance, see Serjeantson 2019.

a partridge (*Alectoris* sp.), a finch (Fringillidae), and a possible quail (?*Coturnix coturnix*) are the bird taxa deposited in the cistern. Small eggshell fragments have also been found in most strata.

Sea-shells[151]

A vast concentration of sea-shells has been found in stratums 5 and 6. The vast majority of them are complete purple shells, apparently thrown in the cistern all together.

Discussion

Based on the excavational record and the analysis of the remains the following interpretation can be proposed. The Archaic cistern stopped being used as such some time before the Late Hellenistic/Early Roman times and was subsequently filled with soil and stones. When the filling was almost complete a mass of animal remains was thrown in. This included parts of two equids, one of them a donkey and the other a young horse, a pig and a piglet, a bovine, and four sheep and goats. Furthermore, pieces of several dog carcasses, of various sizes and including a large number of puppies, were also thrown in along with snakes, birds, eggs, fish, probably frogs, and a pile of sea-shells. On top of all these a number of complete or broken glass vessels was thrown in the cistern. More soil eventually accumulated over the top.

Such a fill could represent ordinary refuse, which people needed to dispose of in some easy way. Broken or complete vessels often end up in functioning cisterns or wells as do dead animals.[152] Often enough such features function as traps for a variety of animals from the nearby areas, which accidentally fall in them. If the above scenarios however were true in our case, we would expect to encounter a variety of finds. In our case, apart from the variety in animal taxa, and the abundance of glass fragments, very little else is present.[153] Wood charcoal and carbonized seeds are very few, the small objects and architectural pieces are extremely scarce and surprisingly, even pottery is very scant. Apparently the fill of this cistern was of a different nature.

An alternative interpretative scenario could be that during the filling of the cistern, in order for it to be sealed, the animals, especially the dogs and the snakes, were disposed of in it, after they had been killed elsewhere, perhaps in a cleaning operation around the sanctuary. This scenario, however, also seems improbable. That is because the adult dog carcasses were already disarticulated, and their bones were probably free of meat before they were deposited. Furthermore, some of the dog bones are burned and cut, which of course implies some processing before their disposal in the cistern. The cut mark on the 1st phalanx is probably indicative of skinning. The evidence for burning and probably cooking and eating of snakes is similar. It appears that the deposition in the cistern had been the end stage of a series of actions that took place in the vicinity of the cistern.

The combination of animal remains in the cistern is very unusual and their interpretation has been quite challenging. The approach adopted for their contextualization was to explore all possible meanings and associations of each type of animals in the ancient Greek world (Classical, Hellenistic, and Roman), as these are evident in the archaeological and written record, looking for common themes that could connect the animals found in the cistern and might suggest a frame of reference in which their co-existence would become meaningful.[154] The results of this approach are incorporated in the discussion bellow.

No published bone assemblages similar to this one exists so far in the Greek world[155] although individual taxa, especially dogs and puppies as well as birds (chicken, pigeons) are occasionally reported.[156] Several cases of dog bones found in various contexts, often indeterminate, within sanctuaries have been reported[157] but few cases stand out as more relevant. More or less partial remains of several dogs, some burned and with cut marks on them, have been reported from five wells at Didyma, near Miletus and also from a well in the Hellenistic Agora in Pela in Macedonia.[158] Dog bones with cut marks but no burning traces have also been identified at the Sanctuary of Apollo Daphnephoros at Eretreia[159] and from the Sanctuary of Poseidon at Isthmia.[160] All those cases testify dog consumption and occasional links to its ritual role.

The tale-telling signs of burning and cutting on animal remains from the cistern at Kalaureia suggest that we are dealing with a case of preparation, probably cooking and consumption, of a range of animals not usually considered as edible, or species that were considered edible under specific circumstances. Even the species that do not bear such cutting

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[151] Syrides 2019.

[152] For examples, Poulou-Papadimitriou 2008 (Byzantine—Eleutherna, Crete); MacGillivray *et al.* 2007; Wall-Crowther 2007 (Bronze Age—Palaikastro); Roberts & Glock 1986 (Archaic—Agora in Athens).

[153] The presence of the glass vessels poses a problem of dating, and it seems possible that they represent a somewhat later addition to the deposit in the cistern (pers. comm. Dominic Ingemark; Penttinen & Mylona 2019).

[154] Mylona 2015.

[155] Similar combinations of "unusual" animals are reported from the Etruscan world, e.g. Cardini 1970; for more examples and discussion Rask 2014.

[156] For the dogs, indicatively Day 1984; Luce 2008; Roy 2007; discussion in Mylona 2013. For the chicken, Brun & Leguilloux 2013; Villing 2017.

[157] For a synoposis of this evidence, Roy 2007.

[158] Richards-Yielding 1998.

[159] Studer & Chenal-Velarde 2003, 180.

[160] Gebhard & Reese 2005, 140.

and burning traces could by association be considered as belonging to the same event (see taphonomy discussion above). The issue of edibility in ancient Greece is a complex one and it mostly refers to foods of animal origin. Leaving aside cases of vegetarianism derived from philosophical conviction or religious prescriptions, very few animal foods appear to have been considered totally inedible.[161] The horse for example, which, despite its cultic prominence was considered by the ancient Greeks generally inedible[162] could be consumed in a medicinal context.[163] The same goes for the dolphin, the most inedible of all fishes.[164] It appears that in ancient Greece, there were certain circumstances, rituals, health conditions, or local customs that permitted the consumption of even those animals that were otherwise considered inedible. In other words, their consumption (or else the abstinence from them) functioned as a factor of distinction between certain groups, be they religious, racial, philosophical or other.[165]

The most common animals found in the cistern are not "typical" sacrificial animals that were sacrificed on an altar and consumed at sacrificial meals (at least as far as our sources go).[166] However, sacrificial function of those animals was not excluded altogether. They are either referred to as sacrificial victims in the geographical or social periphery of the Greek world, or mentioned as curious or uncommon phenomena. The sacrifice of the cockerel as a means of ensuring protection from the scorching south-west wind and a good grape harvest at nearby Methana is such an example.[167] Alternatively, the sacrifice of these "unusual animals" is linked to a specific god only or to specific circumstances. Horses, for example, were sacrificed to Helios or to Poseidon in specific cases,[168] while puppies were sacrificed to Ares at Sparta.[169]

Most of the "unusual animals", such as the snakes, the lizards, the frogs, and the crow, were not considered edible.[170] Even those that were perceived as a possible source of food were often covered by alimentary taboos.[171] Eggs, for example, were strongly related at the symbolic level to the regeneration of life and their consumption was in some cases a taboo[172] while the chicken was not eaten by the initiated at the Eleusinean mysteries.[173] Several ancient sources however make it clear that the same animals were eaten by individuals or groups in the social and geographical periphery of the Greek world, or that their status as edible or inedible could change.[174] The edibility or not of dog's flesh is a good example of such a case.[175]

Some deities appear in the textual record to be related to several of these animals more often than others. Poseidon, Hekate, and Asklepios are the names that appear most often. Puppies, snakes, and cockerels, animals with medicinal properties were apparently part of the healing process in the Asclepieia and the actual animals apparently lived within their precincts.[176] Hekate was a goddess linked to the women's world, to child bearing, to cross-roads, and to the darkness. Dogs, snakes, fish, and eggs are known to be connected to her.[177] At the end of the old moon and the rising of the new one, a special kind of food was placed near statues and altars of the goddess. This consisted of roasted puppies, fish, eggs,

[161] For vegetarianism in ancient Greece, Osborne 1995; for the Orphics' and Pythagoreans' abstinence from eating meat or other animal products, Plut. *Quaest. conv*. 728–730; Porph. *Abst.*; Porph. *Vita Pyth*. 44, 45; also Garnsey 1999, 108–111; Guthrie 1993; Detienne 1989a, 5–8; Teodorson 1989; for a special group of female devotees to Demeter called "the Bees", Detienne 1989b, 145.

[162] For the horse's cultic prominence, Simoons 1994, 180–183; Burkert 1985, 138 and for its inedibility Koppers 1936.

[163] E.g. Gal., *Nat. Fac.* 3.1.9; Grant 2000, 154–190; Dalby 1996, 60–61; Simoons 1994, 180–183; Garnsey 1999, 83–85.

[164] Ancient Greeks included dolphins among the large fish; for a discussion on their inedibility, Mylona 2008, 107–108.

[165] For a detailed discussion of the issue of food as a marker of distinction, Lupton 1996, 25–27; for two clear examples of the distinction between Greeks and others on the basis of food, Shaw 1982/1983 (Greeks and Skythians) and Mylona 2008, 73–74 (Greeks and *Ichtyophagoi*).

[166] For the typical sacrificial animals, Burkert 1985, 55–59; Rosivach 1994; for a systematic treatment of the iconography of animal sacrifice, van Straten 1995; for the consumption of the sacrificial animals, Durand 1989; Detienne 1989a; Ekroth 2007; 2008; Hitch *et al.* 2017.

[167] Paus. 2.34.2.

[168] For the sacrifice of horse to Poseidon by the Argives by submersion in the Dine spring (Whirlpool) in Argolis, Paus. 8.7.2; also Georgoudi 2005, 139; for the sacrifice of horses at Bryseai in Lakedaimonia, Paus. 3.20.4; for the sacrifices by submersion in general, Koch Piettre 2005.

[169] Scholz 1937, 14–24; Merlen 1971, 86 and also Mainoldi 1984, 51–59 for a list of literary references to dog sacrifices.

[170] See relevant entries in *RE* 1942–1966 as well as in reviews of ancient food items by Soyer 1977 (1853); Dalby 1996; Brothwell & Brothwell 1998.

[171] For a detailed treatise of alimentary taboos covering various types of animals, Simoons 1994.

[172] Plut. *Quaest. conv.* 635c, discussed in Burkert 1983, 40, n. 25.

[173] Porph. *Abst.* 4.16 (initiated abstained from domestic birds, fishes, beans, pomegranates, and apples).

[174] Parker 1983, 357–365; eggs for example appear as uncommon ingredients in elaborate dishes in the context of extravagant symposia (Dalby 1996, 112; Dalby & Grainger 1996, 47, 97, 117); for archaeological eggs that were not eaten, Serjeantson 2009, 178–179; Mylona 2013 *passim*; eggs have been recorded from other sanctuaries as well, references in Villing 2017, 76.

[175] Luce 2008.

[176] Snakes were regarded as incarnations of Asklepios at Epidaurus, Kos, and also in Rome. Asklepios is also related to dogs. In many of his shrines we have evidence for the maintenance of sacred dogs (Epidauros, Athens, Lebena, Rome), Farnell 1970 (1921), 240. It should be noted that chasms and the presence of water (both met at a cistern) were also integral parts of the healing practice.

[177] Von Rudloff 1999, 85–86, 120–122, 122–123.

cheese, and honey cakes that were consumed by the poor.[178] Hekate is also a goddess who was known from the *Theogony* to be associated with Poseidon, the god of the sea and the springs. Together they were prayed to by fishermen.[179] The example of the shared characteristics (protectors of sea fishing) between the deities which are usually considered by the Classical discourse unrelated, as in the case of Poseidon and Hekate is instructive. Given that the ancient Greek pantheon comprises of deities with a wide range of traits each,[180] it should perhaps be more fruitful in our quest to view the associations of animals not with the deities themselves but with the forces they represent in each case.

Many of the animals in the cistern had a strong association with water and earth. On the one hand we have the aquatic element in the form of purple shells, the fish, the water snakes, the frogs. On the other hand we have the chthonic element in the form of snakes, lizards, dogs, puppies, and eggs, and probably the crow. A joined cult like the one represented in the example of Poseidon and Hekate cited above could explain the combination of the two domains, but would leave out several of the animals that do not fit in any given scheme.

Divination and magic are two domains which cover almost all the categories of animals found in the cistern. Divination had many forms in antiquity, and it was practised both in sanctuaries and in more secular contexts.[181] It is interesting that almost all the animals in the cistern could have a divinatory function.[182] The use of the animals in magic appears at first a link worth investigating. Magical processes and rites could explain away almost all the "strange" finds in the cistern.[183]

Use of "unusual" animals as food and/or in ritual could be related to a side of life in a sanctuary that was not reported in the public, at least in written form, that was not commented upon formally or informally. If we research each type of animal separately, many are linked to magic, medicine, superstition, or situations that take place in the social periphery. Consumption of these animals acquired meaning, or alternatively gave meaning to these acts, obviously defining the circumstances of the people who participated. The date of this unusual assemblage (H II = Late Hellenistic/Early Roman) might be significant. In this chronological context, the find could perhaps reflect new cultic practices and religious influences from east or west, but given the fact that so far it remains unique in the sanctuary itself and in the Greek world more generally, makes any such links rather tenuous.[184]

Building C. Mammal and fish remains

The trenches dug in the area of Building C (*Fig. 26*) are all characterized by a dearth of animal bones (and other bioarchaeological remains) relative to other excavated areas within the sanctuary. Only 32 identifiable bones and 459 non-identifiable fragments have been found, most of which are smaller than 1 mm in length. The bones have been hand collected during the excavation or retrieved from ten water-floated soil samples (a total of 230 litres of soil). The animal bones from these strata are extremely eroded. Their surface is so pitted and worn that any features such as cut or gnawing marks, which might initially be present, have been obliterated. The bad preservation might be a result of the heavy disturbance of sediments which has taken place in this area from antiquity to present. As a result the bone assemblage from Building C is very small. It mostly originates from fills and deposits of a fairly mixed nature.[185] For these reasons, in the following presentation of the material, the bones have been grouped in fairly broad chronological sub-assemblages. Their discussion will by necessity remain generalized (*Table 40*).

BONES FROM LATE ARCHAIC STRATA (A II)

The earlier definitely dated activity phase in the area of Building C is the Late Archaic. Among the animal remains from these strata pig and ovicaprid (probably goat) bones have been identified. Some of the smallest bones fragments are burned black and/or white. Anatomically pig is represented by a humerus fragment and a maxillary tooth, and goat by a radius fragment, while a humerus, a tibia, two mandibular teeth, and one maxillary tooth have been identified as belonging to an ovicaprid, but could well belong to the same goat.

[178] Von Rudloff 1999, 112–115, 123.

[179] Hes. *Theog.* 440–443: "and to those whose business is in the grey discomfortable sea, and who pray to Hecate and the loud-crashing Earth-Shaker, easily the glorious goddess gives great catch, and easily she takes it away as soon as seen, if so she will", transl. Hugh G. Evelyn-White. Furthermore, there is some tentative evidence for an association between the two at Eleusis, where an Archaic temple of Hekate has been located underneath a Roman temple dedicated to Poseidon and Artemis Propylaia, Clinton 1988, 76.

[180] Poseidon, for example, except being worshipped as the ruler of the sea was also worshipped as the Shaker of the Earth, the Protector of the Crops etc. For the various epithets and characteristics of Poseidon, Burkert 1985, 136–139.

[181] For definitions and more general discussions of magic and divination, see Graf 1997; Giraolo & Seidel 2002; Halliday 1913.

[182] For the practice of alektryomancy for example (divination by roosters), van der Horst 1998; for divination by snakes, Orph. *Lith.* 705–715; for the use of various birds in magic rituals, Zografou 2011. For other examples for each type of animals in the assemblage, Mylona 2013.

[183] For an abundance of reference to various animals, Betz 1986.

[184] See n. 155.

[185] Wells *et al.* 2005, 183–202; 2006–2007, 99–114.

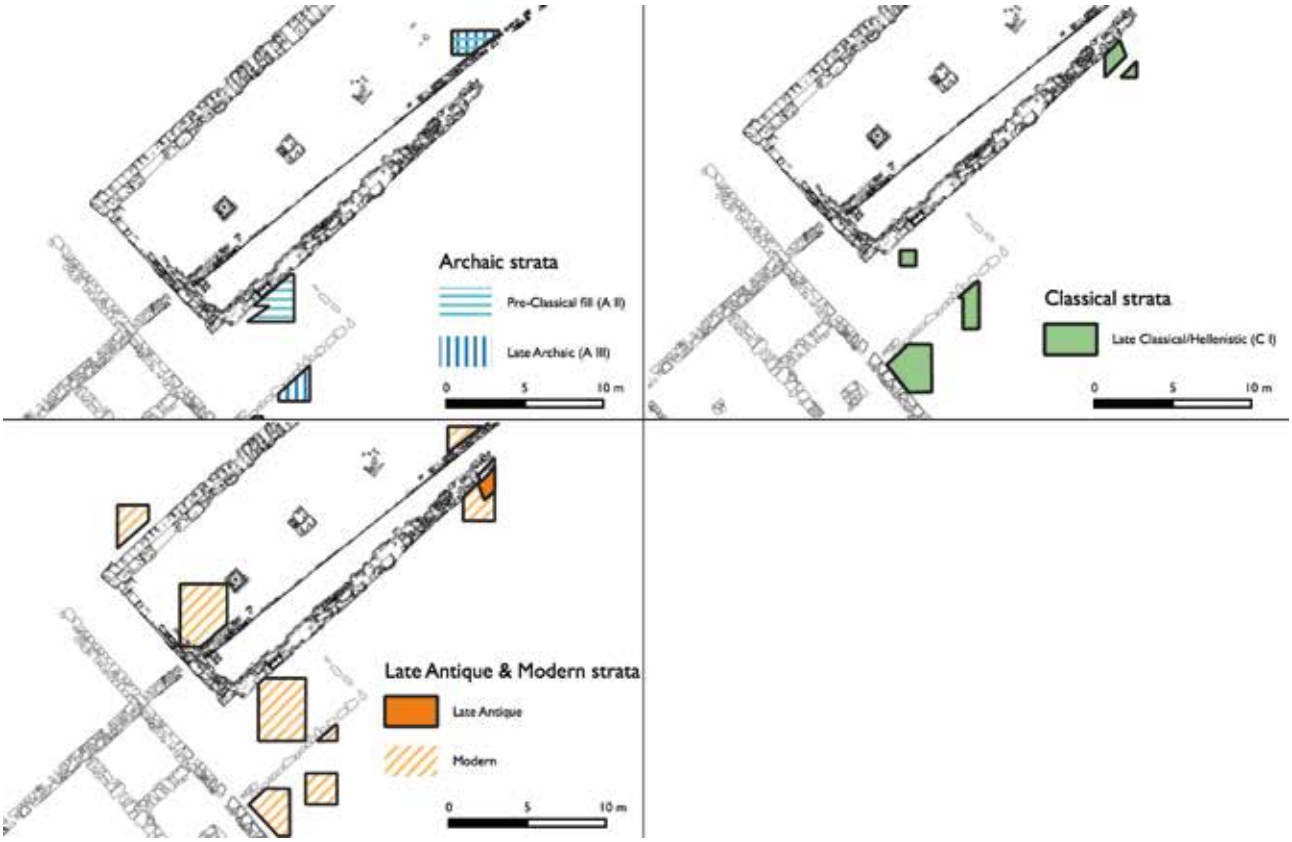

Fig. 26. Plans of Area C with excavated areas dating to the Archaic (A II & A III), Late Classical/Early Hellenistic (C I) and Late Antique & modern period. By R. Rönnlund.

Table 40. Area C. Mammal bones. Taxonomic representation.

	Late Archaic (A II)		Pre-Hellenistic (C I)		Late Classical/Early Hellenistic (C I)		Late Antique disturbance		Mixed and modern	
	NISP	%	NISP	%	NISP	%	NISP	%	NISP	%
Cattle					2	20			5	
Pig	2	22.2			1	10			1	
Sheep/goat	5	55.5			6	60			2	
Goat	1	11.1								
Medium-size mammal									1	
Fish					1	10				
Bird	1	11.1								
Small mammal									4	
Identified total	9	100	0	-	10	100	0	-	13	100
Non-identifiable	36		26		248		8		41	
Total	**45**		**26**		**258**		**8**		**54**	

BONES FROM MIXED PRE-HELLENISTIC STRATA (A II AND A III)

There is a small group of unidentifiable bone fragments (NISP 29) which originates from mixed contexts. Those, could, on the basis of their pottery, be dated as Pre-Hellenistic (mixed contexts with material as early as the Late Archaic period). They are all non-identifiable bone splinters, extremely eroded and brittle. They belong to both large- and medium-size mammals.

BONES FROM LATE CLASSICAL/EARLY HELLENISTIC STRATA (C I)

The Late Classical/Early Hellenistic strata (C I) have produced the largest number of bones. Among them only ten are identifiable, while 248 are non-identifiable bone splinters smaller than 5 cm in length. Several of them (about 33%) are as small as 1 cm in length, but several, especially those found in the fill associated with construction taking place in this period are large in size (about 10 cm in length), quite unlike any other bone from Building C. The large size of several of the bones and the relative abundance of finds echoes similar features of the pottery.[186] In Late Classical/Early Hellenistic deposits, as in the rest of bone groups from Building C, bone preservation is extremely bad. A few of the non-identifiable bones have been burned black and white. They are all tiny fragments smaller than 1 cm in length and appear to be scattered in a specific area.

The identified animals in this sample are cattle, pig, and sheep or goat. There has also been found one fish bone, an anterior abdominal vertebra of an indeterminate very small fish (≈ 10 cm). Cattle are represented only by two teeth (one mandibular and one maxillary), pig by one radius fragment, while the indeterminate ovicaprid by a radius, a tibia and a metatarsal fragment as well as by a single fragment of a mandible and one mandibular tooth.

BONES FROM STRATA DISTURBED IN LATE ANTIQUITY

A small number of tiny bone fragments (<2 cm in length) has been collected from the area of C5, and more specifically from strata disturbed in Late Antiquity.[187] These are all non-identifiable and extremely eroded bone fragments.

BONES FROM RECENTLY DISTURBED STRATA

The Building C animal bone assemblage also contains a relatively large amount of bones originating from strata heavily disturbed, either by the 19th-century excavations or by the nearby 20th-century farmstead. Those remains show no remarkable features apart from their extreme erosion. The microfauna remains retrieved from the strata are most probably intrusive, judging by their excellent preservation condition, which is quite unique for the Building C material.

Concluding comments

This paper focuses on a fraction of the animal remains recovered from the Sanctuary of Poseidon at Kalaureia, those that were produced during excavations of the years 2003–2005 in Areas D and C. They originate from both closed, well-structured deposits, and from deposits that have been disturbed in antiquity and in more recent times. In a way the picture conveyed by their analysis is representative of certain features of the animal remains in any Greek sanctuary. The assemblage is dominated by the typical sacrificial animals, with a small contribution of other species such as equids, dog and fish. There is a variety of deposits, some related to dining and some of a more cultic character, and one can discern certain changes through time in the emphasis placed on different animals. This assemblage, however, appears to stand apart in several respects, such as the high frequency of marine animals, fish and molluscs in a cultic space, the significant deliberate presence of microfaunal remains (reptiles, birds, frogs etc.) in closed deposits which are related to cult, and the absence of direct evidence for animal sacrifice. The analysis presented in this paper makes it clear that what seems unusual in this assemblage could well be the result of taphonomy and the collection methods that were applied during excavation. Further work in the sanctuary (excavations on site are ongoing) increased the number of unusual features which involve the use of animals, but also reveal certain persistent trends. These will be discussed elsewhere along with the development over time of human-animal relations in the area in the shade of the Sanctuary of Poseidon at Kalaureia, the persistent trends, and the innovations in these relations.

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[186] Jenni Hjohlman pers. obs.
[187] The location of Area C5 is marked on figs. 2 and 4 in Penttinen & Mylona 2019.

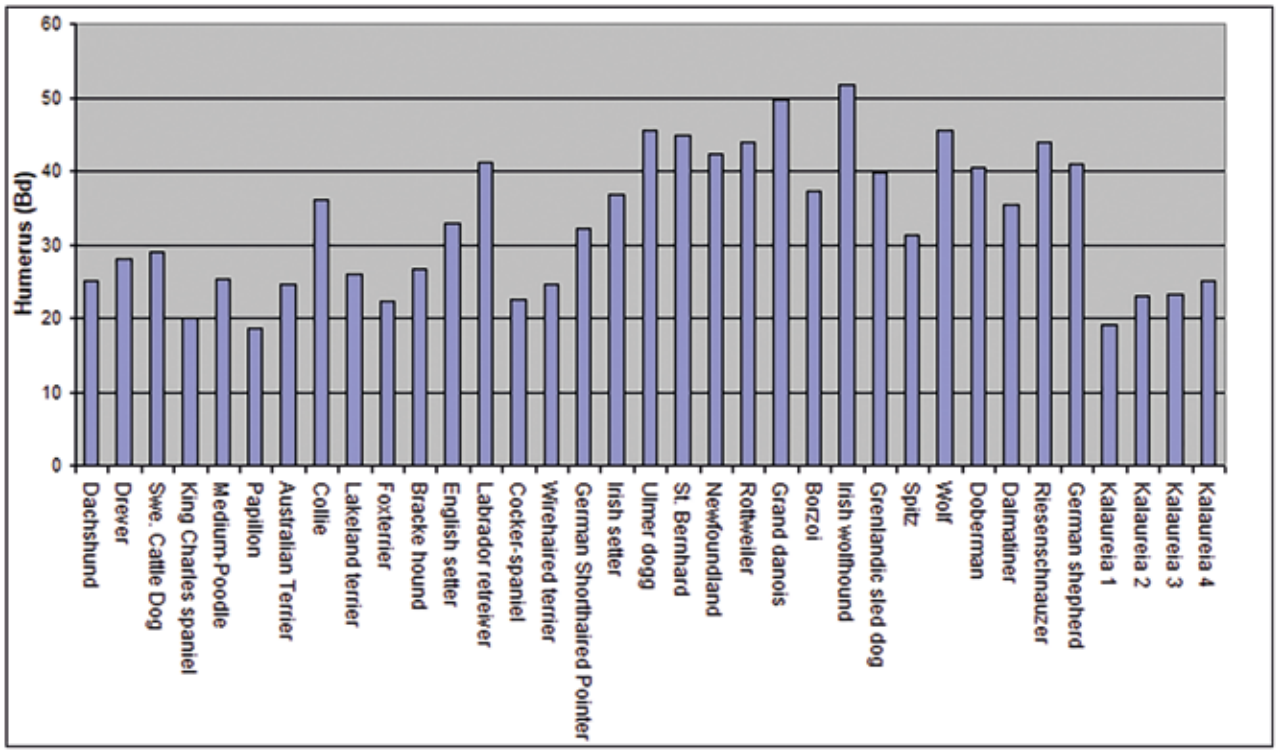

Fig. 27. The distal breadth of humeri of dogs from the Sanctuary of Poseidon at Kalaureia in comparison with modern-day dogs and wolves. The modern dogs have been clustered together according to breed showing only the mean value for each breed. Total modern-day dogs n=66.

Appendix. Measurements of dog bones from the Late Hellenistic/Early Roman fill of the cistern (Feature 03)

By Adam Boethius

This analysis is based on seven measurable dog bones, all from adult animals. They are all from the fill of Feature 03, the cistern. They were found together, but mixed with bones of various other animals. On archaeological grounds the assemblage is considered a closed one, formed at one time or in a very short period of time (H II). Some of the adult dog bones from this context are burned, while others bear cut marks. Both features indicate that the adult dog carcasses were processed.[188]

The dogs from the Sanctuary of Poseidon have been compared with modern dogs from the Museum of Zoology in Lund, the Museum of Zoology in Copenhagen, and the Museum of Natural History in Gothenburg. All dogs have been measured following Angela von den Driesch.[189]

Due to fragmentation of the dog bones, at this stage it has not been possible to tackle in any detail issues pertaining to breed, life histories etc. What the available measurements make clear, however, is that we are in no way dealing with a unified dog group. The different dogs vary in size from being as small as a modern-day Papillon to roughly the size of a German shepherd. It has not been possible to calculate a proper withers height on the Kalaureian dog bones due to absence of complete bones. However a rough estimation based on the comparison with modern-day dogs would give us a height at the withers between 30 cm for the smallest dogs, up to around 60 cm for the biggest, with an average around 40 cm (*Figs. 27–29*).

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[188] See discussion above by Mylona.

[189] von den Driesch 1976.

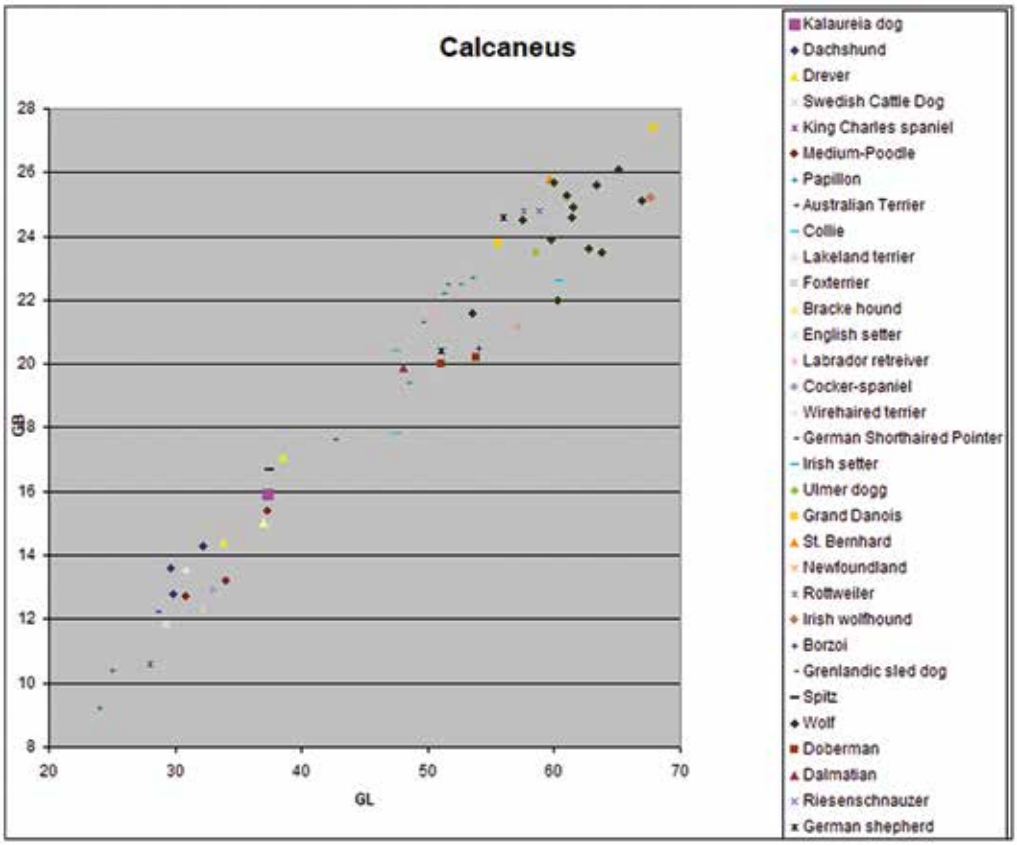

Fig. 28. Greatest length and breadth of complete dog calcanei from the Sanctuary of Poseidon at Kalaureia in comparison with modern-day dogs and wolves.

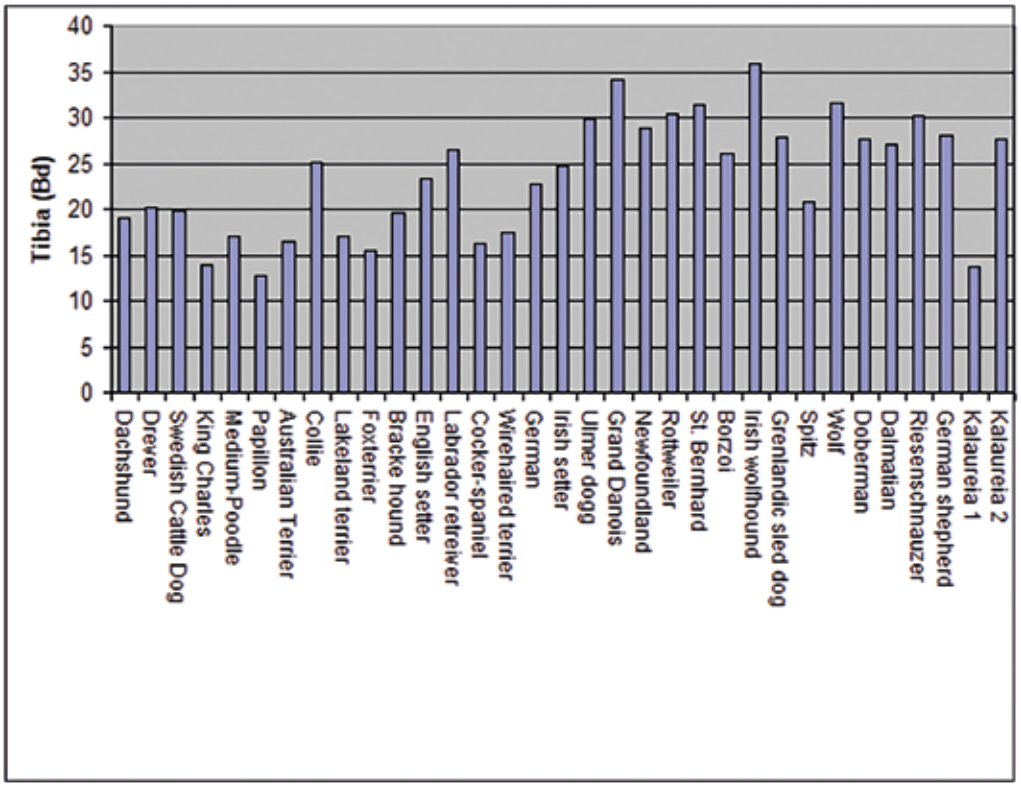

Fig. 29. The distal breadth of tibia of the dogs from the Sanctuary of Poseidon at Kalaureia in comparison with modern-day dogs and wolves. The modern dogs have been clustered together according to breed showing only the mean value for each breed. Total modern-day dogs n=66.

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