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From snout to tail

Exploring the Greek sacrificial animal from the literary, epigraphical, iconographical, archaeological, and zooarchaeological evidence

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ABSTRACT

Animal sacrifice fundamentally informed how the ancient Greeks defined themselves, their relation to the divine, and the structure of their society. Adopting an explicitly cross-disciplinary perspective, the present volume explores the practical execution and complex meaning of animal sacrifice within ancient Greek religion (*c.* 1000 BC–AD 200).

The objective is twofold. First, to clarify in detail the use and meaning of body parts of the animal within sacrificial ritual. This involves a comprehensive study of ancient Greek terminology in texts and inscriptions, representations on pottery and reliefs, and animal bones found in sanctuaries. Second, to encourage the use and integration of the full spectrum of ancient evidence in the exploration of Greek sacrificial rituals, which is a prerequisite for understanding the complex use and meaning of Greek animal sacrifice.

Twelve contributions by experts on the literary, epigraphical, iconographical, archaeological and zooarchaeological evidence for Greek animal sacrifice explore the treatment of legs, including feet and hoofs, tails, horns; heads, including tongues, brains, ears and snouts; internal organs; blood; as well as the handling of the entire body by burning it whole. Three further contributions address Hittite, Israelite and Etruscan animal sacrifice respectively, providing important contextualization for Greek ritual practices.

Keywords: Greek animal sacrifice, anatomy, division, butchery, body part, multi-disciplinary approaches, zooarchaeology, iconography, epigraphy, texts, cross-cultural comparisons

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GUNNEL EKROTH

12. To burn it all?

The practice of holocausts and moirocausts in ancient Greek religion

Abstract

This paper offers a review of holocaustic rituals in written and material sources arguing that this type of sacrifice was rare. It further addresses if the animal was burned whole or if the carcass was flayed, emptied of blood and intestines, and sectioned before being placed onto the fire. Since the evidence suggests that holocausts did not necessarily mean the burning of an intact animal, the relation between holocausts and moirocausts, sacrifices at which a larger part of the animal was burned, is also explored. Finally, the ancient evidence for holocausts is considered in the light of the results of the experimental cremation of a lamb and a pig performed at Uppsala in 2014. It is argued that a Greek holocaust may have aimed at burning the meat beyond human means of consumption rather than at a total annihilation of the carcass by fire, and that the long time it seems to have taken to perform a holocaust can be linked to the purpose of the ritual.

Keywords: Greek animal sacrifice, experimental archaeology, holocaust, moirocaust, burning, fire, carcass, meat

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Holocaustic sacrifices, rituals at which apparently the entire animal was put into the fire and no meat was left for the worshippers to consume, are perhaps the least studied of Greek sacrificial practices. But what did such rituals actually mean in terms of the treatment of the sacrificial animal's body? This paper will take a closer look at the practicalities of holocaustic sacrifices of animals, in particular cattle, sheep, goats, and pigs.[1] Of central importance is what the treatment of the animal's body may tell us about how these sacrifices fit into the larger context of burning as a ritual action in Greek sacrificial practice, but also about the role and function of holocausts within Greek religion at large. In what follows, I will address the wholeness of the animal's body at holocausts, the partial burning of the sacrificial victim, as well as reflect on the results of an experimental holocaustic burning.

Background

Our knowledge of holocaustic sacrifices comes primarily from the epigraphical and literary record.[2] Yet, overall, the body of direct evidence is quite small and scattered. Such rituals are visible in the epigraphical material from animals marked as ὁλοκαυτός—to be burned whole, or through a similar terminology focussing on burning, καυτός (cf. also the related verb καρπόω). In the literary texts, we meet other terms, foremost the verb ἐναγίζω, which is used for holocausts for recipients who have a connection with the realm of the dead, such as the departed and the heroes.[3] There is also the verb ὁλοκαυτέω but this is mainly used for non-Greek sacrifices, in particular Israelite ones.[4] Apart from these direct instances of sacrifices being marked as holocausts, there is circumstantial evidence,

[1] Birds and fish could also be burned whole, but are left aside here. Chickens and roosters sacrificed as holocausts are known from Isis cults, see e.g. Leguilloux 2003, 507–508; Brun & Leguilloux 2013, 167–180. For a probable holocaust of fish, see the sacrifices to Herakles Diomedonteios on Kos, *CGRN* 86, C line 82.

[2] For the written evidence for holocausts, see Ekroth 2002, 217–242; 2017a, 47–50; 2018, 310–312.

[3] On *enagizein* and its related nouns *enagisma* and *enagismos*, see Ekroth 2002, 74–128.

[4] See Rudhardt 1992, 286–288. The term is also encountered in the new Marmarini inscription (*CGRN* 225), which mainly concerns Near Eastern divinities, see Parker & Scullion 2016, 225–228 and 252–253. See also Pirenne-Delforge in this volume, *Chapter 10*. For the relation between Greek and Israelite practices, in particular holocausts, see Ekroth 2018 as well as Greer in this volume, *Chapter 14*.

especially in sacrifices where no priestly perquisites of meat were handed out, which could be taken as an indication that the animal was entirely burned.[5]

Judging by the written evidence, holocausts were never a prominent feature of Greek ritual practice. The small number of concrete instances evidenced in inscriptions and texts should be compared to the frequency of *thysia* (the verb *thyein* clearly referred to a sacrifice at which the meat was eaten), or the many epigraphically attested cases where no particular term is mentioned, but where meat is handled and consumed at sacrifices. Unusual actions, not only holocausts but also a particular handling of the blood, had to be marked: sacrifices where there was no meat to consume was evidently such a case. Apart from using special terminology, non-consumption needed to be highlighted as an unusual feature. An example is the sacrifice of a piglet to Zeus Polieus in the sacrificial calendar from the deme Thorikos in Attica, dated to the second half of the 5th century BC.[6] This ritual is specified as a holocaust of a piglet, and a further clause adds that "the priest is to provide lunch for the attendant" on this particular occasion, underlining that there was to be no meat to consume. The infrequency of holocausts is also evident from a quotation of Theophrastus in Porphyry: "If the Greeks were ordered to sacrifice like the Jews and the Syrians did, they would stop to do so altogether, since these people do not eat the animals but burn them completely."[7]

If we turn to the iconographical evidence for Greek ritual practice, there are no evident depictions of holocausts in comparison with the around 300 images of various stages of *thysia* sacrifice.[8] Certain unusual scenes, for example of a low altar on top of which the skull of a bovine is placed, have been suggested as possible representations of a holocaust, but these are better interpreted as denoting the commemoration or inauguration of an altar through the deposition of a *bucranium*.[9] This absence of depictions of holocausts can be taken as an additional indication that holocausts were unusual, but we should remember that there are hardly any depictions of purifications, oath takings and battlefield sacrifices, rituals which usually did not include any consumption of meat either.[10]

We seem to be facing iconographic conventions of what can or should be shown, but the lack of representations of holocausts concurs with the dearth of such rituals in texts and inscriptions. A more compelling argument for the scarcity of holocausts is the zooarchaeological evidence. While *thysia* sacrifice is attested archaeologically at almost 20 Greek sanctuaries, from the very end of the Bronze Age into the Hellenistic period, and each new sanctuary excavation that yields bones seems to add to this number, there are very few cases of holocausts revealed by the zooarchaeological record.[11]

Within the Archaic to Hellenistic periods, holocausts of piglets are demonstrated in the cult of Demeter and Kore. At the Sanctuary of Demeter and Kore in the city of Mytilene on the island of Lesbos, pits filled with ash and thousands of remains of calcined juvenile piglets were recovered, dating to the late Archaic to early Hellenistic periods.[12] The bones stem from all parts of the skeleton and show some evidence of butchering. Also in the Sanctuary of Demeter and Kore at Corinth, burnt piglets have been recovered in connection with a fire-scarred pit, and what seem to be piglets burned as holocausts have been found in the Sanctuary of S. Anna at Akragas, Sicily, as well.[13] The presence of piglet holocausts within the cult of Demeter is surprising, but these burnt piglets may represent a variant of the ritual at the Thesmophoria, when piglets were deposited into hollows or pits called *megara*, where they were supposed to rot. The burnt piglets would constitute an alternative treatment of the Thesmophoria piglets, at present only visible in the archaeological record.[14] A possible holocaust of a goat and two sheep, and what may have been the fleece of a ram, was found in a pit under the early 6th-century BC Temple R at Selinous, also suggested to be dedicated to Demeter and Kore.[15] This sacrifice may have been part of the rituals linked to the construction of this temple.

In addition to these cases, the most evident example of holocaustic sacrifices comes from the Palaimonion at the

[5] Scullion 2009.
[6] *CGRN* 32, lines 15–16; Daux 1983.
[7] Porph. *Abst*. 2.26.1–2; Theophr. fr. 13 (Pötscher).
[8] See the extensive collections of evidence in van Straten 1995 and Gebauer 2002. For the iconography of holocausts, see Ekroth 2017a, 50–54; 2018, 312.
[9] van Straten 1995, V382, fig. 168; Ekroth 2017a, 51–52. On role of the *bucranium* within sacrificial ritual, see also Zachari in this volume, *Chapter 7*.
[10] For the lack of depictions of such rituals, see van Straten 1995, 3–5; Ekroth 2017a, 52–53.
[11] For the zooarchaeological evidence for *thysia*, see Ekroth 2009, 150–151; 2017a, 47cf. Leguilloux 2004, 64; Reese 2005, 121–123. Evidence for holocausts, see Ekroth 2017a, 54–57; 2018, 312–313.
[12] Ruscillo 2013.
[13] Corinth: Bookidis & Stroud 1997, 243–244. Akragas: Miccichè 2020, 258–259. I am grateful to Sara Karatas for this reference.
[14] The bones from the excavations at Olympia deriving from an undisturbed patch of the Black Layer under the wall of the Pelopion have been interpreted as corresponding to a complete burning of the animals, as elements from the head, body and limbs are represented (Benecke 2006, 247–248). The excavator interprets the bones as deriving from sacrifices as well as from meals, the material being broken up and possibly re-burned after each occasion, see Kyrieleis 2006, 42–47. The burnt or calcined Iron Age material from the sanctuary at Thermon has been suggested to represent holocausts or alimentary rituals, see Gardeisen 2008, 305–311; Papapostolou 2012, 33–36 and 107. Yet some burnt fragments seem to stem from long bones, which could indicate *thysia* sacrifice and does not exlude consumption of the meat.
[15] Marconi *et al*. 2017, 78–79 and 82–86. The ram was only evidenced by a small part of the skull and the horn cores, which may suggest that were attached to the fleece (84).

Sanctuary of Poseidon at Isthmia.[16] The Sanctuary of Palaimon was constructed *c*. AD 50 and remained in use into the late 2nd century AD. It had three phases, each focusing on a large stone-lined pit used for extensive burning, with fire that was so strong that the walls had crumbled from the heat. Ash, carbonized wood, bones, botanical remains, and pottery accumulated in these pits. A total of more than 27,000 fragments of very heavily burned, calcined and fragmented cattle bones were recovered, as well as 14 unburnt bones. The burnt bones derive from all parts of the animal, demonstrating that these are the remains of holocausts. This particular treatment of the animals in the cult of Palaimon is in fact confirmed by literary sources, who speak of *enagizein* sacrifices to the hero Palaimon, and by a Roman inscription, which mentions the restoration of an *enagisterion*, which must be the pit for the holocausts.[17]

All evidence for holocausts at Isthmia dates from the Roman period, not earlier. The large scale holocausts at the Palaimonion could be compared with the sacrifices to Artemis Laphria at Patrai, described by Pausanias (7.18.11–13), where living animals were driven into the fire and burned. Both these occasions can be understood as a kind of *interpretatio Romana* of Greek cults, especially Greek hero-cults in the case of Isthmia, while the extravagant ritual at Patrai has been argued to be a Roman invention, inspired by the killing of animals in the amphitheatre, rather than an old, indigenous Greek practice.[18]

We should also note that holocausts could be performed as independent rituals, but were in many cases combined with *thysia* sacrifices, the holocaust always being performed first.[19] In those instances where the evidence is more detailed, it is obvious that the holocaust was usually achieved with small and cheap animals, like piglets or lambs, contrary to the subsequent *thysia* at which sheep or oxen were sacrificed. At a sacrifice to Zeus Machaneus on Kos, the god first received a burnt piglet followed the next day by a *thysia* of an ox and three sheep, while a similar procedure may have been undertaken for Herakles on the same island, who on the same day was presented with a lamb burned whole (*aren kautos*) and the sacrifice of an ox.[20] Holocausts of cattle are never attested in connection with *thysia*, and, on the whole, are very rare. A major purification of a sanctuary on Delos involved the holocaust of a bull, a ram and a boar, while the aforementioned Roman cult of Palaimon at Isthmia focused on cattle as well.[21] The total burning of cattle is, in fact, mainly evidenced in the literary sources, for example, Plato's description of the kings on Atlantis performing a holocaust of bulls.[22] Such literary accounts seem to be far removed from the ritual reality, particularly as far as Plato is concerned.

Holocausts in practice

The terms used for holocausts focus on burning and both the archaeological and zooarchaeological material show that this action was essential. But what did this mean in practice? Was the animal wholly burned as one would assume—hide, blood, intestines as well as meat? *Holos* means whole, entire, complete in all its parts, but what does the *holos* element in a holocaust signify more precisely? Most scholars have assumed the burning of a whole animal, but already Paul Stengel stated that holocaustic victims could be burned in parts, while Scott Scullion more recently has claimed that holocausts did not preclude flaying.[23] The arguments for the flaying of holocaustic victims come foremost from the epigraphical evidence, in particular a sacred law from Aixone in Attica.[24] In this inscription, there is a series of sacrifices where no meat is placed on the table of the deity, nor is the priestess given any portions of meat, only the skin. Scullion suggests that there was no meat to distribute on these occasions, as the whole carcass was burned, after the animal had been flayed.[25] The interpretation is possible, but in my opinion not entirely convincing, as it is based on the absence of evidence being taken as evidence of absence, that is, that no mention of the distribution of the meat automatically means that the meat was burned.[26]

More explicit is a passage from the 4th-century BC historian Metrodoros, quoted by Plutarch.[27] The people of Smyrna would sacrifice a bull to Boubrostis, "The ox-devourer" or even "Ravenous appetite", and this animal was cut up and burned as a holocaust, hide and all. The fact that the hide is mentioned as being burned as well, indicates that this was exceptional. That the burning of the skins was not standard practice may also be suggested by Lucian's mocking account of

[16] For the bone material, see Broneer 1959, 313; Gebhard 1993a, 85 with n. 26; Gebhard & Reese 2005, 125–154. On the Palamonion and its development, see Gebhard 1993a, 88–93; 1993b, 170–172.
[17] Ekroth 2002, 89–114 and 121–126. For the *enagisterion*, see Geagan 1989, 350; *IG* IV 203, line 9.
[18] von Wilamowitz-Möllendorff 1931, 385–387. See also the discussion by Pirenne-Delforge 2006, 111–129.
[19] Ekroth 2002, 217–225.
[20] Zeus Machaneus: *CGRN* 86, D lines 10–16, cf. the sacrifice to Zeus Polieus on stele A lines 33–45. Herakles: *CGRN* 86, B lines 8–10. The sacrifices to Herakles may refer to two different Herakleses, however. See also Ekroth 2002, 217–220.
[21] Purification on Delos: *IG* XI.2, 199, A lines 70–71.
[22] Pl. *Crit*. 119d–120a.
[23] Stengel 1910, 98; Scullion 2009. The exception are pigs, which do not have a fleece or hide to remove, but are instead singed, *heusta*, see Ziehen 1899.
[24] Steinhauer 2004, 155–173; *CGRN* 57.
[25] Scullion 2009, 157–169.
[26] See Ekroth 2017a, 50.
[27] Metrodoros, *FGrHist* 43, F 3 (*apud* Plut. *Quaest. conv*. 694a–b).

the excesses of animal sacrifice.[28] The priest is described as covered in blood, behaving like a primitive Cyclops, when he cuts up the victim, removes the entrails, takes out the heart, pours the blood around the altar and finally burns the goat with its hide and the sheep with its fleece on the altar. The handling of Israelite holocaustic victims has been brought forward in this context as well, since at these sacrifices the animals were definitely flayed before burning.[29] Such practices suggest that holocausts may, already at an early stage of the sacrificial process, not have included the entire body of the animal, since the skin could in fact be removed.

The handling of the blood is less clear. At *thysia*-sacrifice, the animal was killed by cutting the throat or rather by piercing the jugular vein in a controlled manner so that the blood could be kept, prepared and eaten, apart from the small quantity that was splashed on the altar.[30] At rituals of the *sphagia*-kind, the throat seems to have been cut in a more violent motion, making the blood spurt out, sometimes at a particular spot or direction.[31] On a famous cup in Cleveland showing *sphagia*, it is evident that the sword enters the neck of the ram from the side, presumably to cut off the throat in a movement from the inside and out.[32] If there was a desire to empty the carcass of blood, perhaps a similar action was undertaken at holocausts. This would lead to no blood being kept, but it cannot be ascertained from our present evidence.

Of the intestines we know a little more. The extensive mid-4th century BC *lex sacra* from Kos mentioned above, includes a sacrifice of a piglet to be burned on the altar together with its *splanchna*, that is, the liver, heart, kidneys, lungs, and spleen.[33] The innards or intestines, *entera*, are removed, washed and burned as well, but next to the altar. From the Thesmophorion on Thasos, there is a group of small terracotta piglets with their stomachs slit open and the intestines indicated inside the body.[34] A marble figure of a piglet, sold on the art market, represented with the bowels coming out from the stomach and being supported by a human hand, could also be a rendering of a similar practice.[35] These representations may show piglets about to be deposited in *megara* at the Thesmophoria, which had been cut open to quicken the rotting process. On the other hand, if we keep the Koan sacred law in mind, the terracotta figurines and the marble piglet may also represent piglets prepared for holocausts, with the intestines to be removed and burned separately. We can recall here the holocaust of piglets from the Demeter sanctuary at Mytilene, some of which had butchery marks on the ribs and the vertebrae, suggesting that they had been split longitudinally, in a manner similar to the figurines.[36] To open up the animals' stomachs and remove the intestines in order that these be burned separately could have had a particular ritual significance; it could also have been a way to facilitate and quicken the burning process of the rest of the animal.

Finally, what about the carcass itself—was it kept whole or sectioned? Also here we have very little information. At the sacrifice to Boubrostis at Smyrna, the animal was not burned whole but cut into pieces. The zooarchaeological evidence offers some further suggestions. The butchering marks on the piglets from the Demeter sanctuary at Mytilene could represent sectioning in halves.[37] At the Palaimonion at Isthmia, the extensive remains of holocausts of cattle come from a series of large pits, almost 3 by 4 meters and more than a meter deep.[38] The size of these installations may suggest that the bodies were placed whole on top of logs lying across the pits, but the carcasses may also have been sectioned. The bones themselves are less informative as they are heavily burned and maybe even have been re-burned, which makes it difficult to distinguish any cut marks. Israelite sacrificial practices may be relevant as a point of comparison here as well. Both Leviticus and later Jewish sources speak of holocausts of animals which were cut up before burning and even thrown into the fire on the altar in sections.[39]

Implications for moirocausts

Even if our information is sketchy, a holocaust did not necessarily imply the burning of an entire animal in the sense of killing it and putting the body whole in the fire. If a holocaust meant that the animal was skinned, gutted, sectioned, and then burned, the distinction with a *thysia* sacrifice is less obvious, apart from the important fact that at a holocaust there would have been no meat to eat. More importantly, holocausts would in that case not be too different from sacrifices at which a larger part of the animal was burned, the so-called "moirocausts", to use a convenient neologism.[40] By contrast with *thysia* sacrifice, where just the thighbones and the tail section were placed on the altar fire, moirocaust des-

[28] Lucian, *De Sacr*. 13.
[29] Hultgård 1987, 89; Scullion 2009, 15–16.
[30] For the treatment of the blood, see Ekroth 2002, 242–251; 2005; Larson in this volume, *Chapter 11*.
[31] On *sphagia*, see Jameson 1991; 1994.
[32] Cleveland, Museum of Art 26.242; *BAPD* 9003650; van Straten 1995, V144, fig. 112; Jameson 1991, 218, fig. 1.
[33] *CGRN* 86, A lines 33–35; Paul 2013, 36–37. See also Bednarek and Pirenne-Delforge in this volume, *Chapters 9* and *10*.
[34] Muller 1996, 448, nos. 1138–1141, pl. 138; Rolley 1965, 470–471.
[35] Christie's, London, 25 October 2006, lot 110, mid-4th century BC.
[36] Ruscillo 2013, 188.
[37] Ruscillo 2013, 188.
[38] For the Palaimonion pits, see Broneer 1973, 100–102.
[39] For the sectioning of *ôlah* victims, see Hultgård 1987, 89–90; Scullion 2009, 15–22. Throwing: *Letter of Aristeas* (83–120).
[40] For the term, see Scullion 2000.

ignates sacrifices were a substantial portion of the animal was burned. In other words, there was apparently a range of different types of burning, from the complete destruction of the animal in the fire, though not always as a whole carcass, to the burning of a substantial part of the meat or intestines but not the whole animal, and finally the select burning of particular bones and fat that characterizes a *thysia*.

Moirocausts have been defined from the written sources, foremost the epigraphical evidence, for example the *enateuein* sacrifices attested on Thasos and Mykonos, as well as at Selinous, which presumably entailed the burning of a ninth of the meat; another example might be the burning of skins for Artemis at Erchia.[41] When only meat and innards were burned, we cannot trace the action in the archaeological record, but moirocausts also made use of entire body parts, meat as well as bones, like back legs. The recently published Hellenistic ritual norm from Marmarini mentions a sacrifice "in the Greek manner" of any animal apart from pigs, at which the right kidney, what is probably a right extremity, the heart, the stomach fat (omentum), a front leg and a portion of the tail were to go onto the fire as *hiera*, offerings to be burned.[42] The inscription further stipulates that this sacrifice could be followed by another one, and here the person sacrificing was free to let anyone eat of the meat, that is, this second instance did not involve any burning of meat or entrails.

A similar case of more extensive burning is found in the *lex sacra* from Selinous, dated to *c*. 450 BC.[43] To Zeus Meilichios, a ram was sacrificed from which a thigh was to be burned, as well as offerings from the table, which presumably meant some of the meat presented to the god. Also the bones, *ta ostea*, were to be burned, a highly unusual stipulation in Greek ritual inscriptions. Which bones are referred to here is not explained, but it is unlikely that they were the thighbones and tail for the *thysia*.[44] The fact that they are called bones, *ostea*, suggest that they may have been bare bones stripped of meat.

However, the moirocausts should also be considered in the light of the zooarchaeological evidence. If we look at the animal bones stemming from *thysiai*, most deposits are very uniform and dominated by thighbones and tails. At the *Aire sacrificielle* in Eretria, for example, 93% of the burnt bones consisted of thighbones, kneecaps and occasional tail vertebrae.[45] There are some contexts, which contain a broader selection of body parts. At the Long Altar in the Sanctuary of Poseidon at Isthmia, the Archaic and Classical deposits recovered consisted of bones from cattle, sheep and goat.[46] Back legs, and especially thighbones, were particularly common—characteristics of typical altar debris, but among the burnt bones from this altar, elements of the rest of the skeleton were represented as well, such as the rib cage, the head and the lower back legs.

Also the bone material from Altar U in the Greek Sanctuary at Kommos, dated to *c*. 700–600 BC, demonstrates variations on the *thysia* norm.[47] The species are sheep, goats, and cattle. Of the sheep and goats, thighbones dominate, but there are also remains of forelegs and the lower parts of the back leg, as well as ribs and vertebrae of the back. For the cattle, there is a high frequency of tail vertebrae but the cattle bones also include fragments of the lower back and front legs, the spine, the shoulder-blade and the head. The presence of bones from the feet of these animals is interesting, as these sections almost devoid of meat are often thought to have been discarded at the flaying and initial butchering of the animal.[48]

The prominence of heavily burnt thighbones and tail vertebrae in the altar assemblages from Isthmia and Kommos clearly identify them as the remains of *thysiai*, but the presence of other parts of the victims should be noted as well. As these bones are found on or at the altars, they are not likely to represent random burning but rather purposeful activity. The actions visible in the zooarchaeological evidence from Isthmia and Kommos can be compared to the rituals prescribed at Marmarini and Selinous, and may represent zooarchaeologically demonstrated moirocausts. However, the bare bones to be burned in the Selinous inscription complicate this interpretation. This mention of *ta ostea* is unique in the Greek ritual norms and cautions against interpreting all burnt bones apart from thighbones and tails as having been covered by meat before put into the fire. At Selinous, we may be facing an additional category of sacrificial burning, that of bare bones distinct from a *thysia* or a moirocaust.[49] The practical experiments conducted by Jake Morton are here of great interest in order to understand whether the zooarchaeological remains correspond to meat covered or bare bones, as a meat-covered bones demonstrate a different cracking pattern when burned than bare or fat-wrapped bones do.[50]

[41] On the *enateuein* sacrifices, see Ekroth 2002, 220–223. *CGRN* 27, line 5 (Thasos); *CGRN* 156, lines 23–24 (Mykonos) and *CGRN* 13, A lines 10–12 (Selinous). For the burning of skins at Erchia, see *CGRN* 52, col. Γ lines 11–12 and Δ lines 11–12.

[42] *CGRN* 225, B lines 34–44; Parker & Scullion 2016, 242–247. See also the contribution by Pirenne-Delforge in this volume, *Chapter 10*.

[43] Jameson *et al.* 1993, A 17–20; *CGRN* 13, A lines 17–20 with commentary. See also the evidence for possible holocausts under Temple R at Selinous, Marconi *et al.* 2017, 78–79 and 82–86.

[44] See Ekroth 2017b, 31–32.

[45] Studer & Chenal-Velarde 2003, 174 and 177, table 2.

[46] Gebhard & Reese 2005, 144 and 149–152, table 1.

[47] Reese 2000, 422, table 6.1, 444, table 6.2, 453, table 6.4 and pl. 6.3–6.4.

[48] For the burning of the feet of sacrificed animals, see *Hymn Hom. Merc.* 136–140, where Hermes in a pit burns the heads and feet of two cattle stolen from Apollo's herd. See also Dibble and MacKinnon in this volume, *Chapters 3* and *4*.

[49] The extended burning of bare bones at Selinous could represent an alternative manner to re-enact *theoxenia*, using bones instead of meat and other foodstuff, see Ekroth 2017b, 29–32.

[50] Morton 2015, 72–73.

This brief review of holocausts and moirocausts opens up a more complex scenario for the handling of the Greek sacrificial victim. The question is how strict we are to be in our modern establishment of categories for the burning of the animal's body, whether whole or in parts. Have we exaggerated the distinction between holocausts and moirocausts, as well as between moirocausts and *thysia*? These three rituals could be performed in combination, for example, holocausts before *thysiai* or moirocausts as a part of *thysiai*, although burning was the central action at all three. Are we to see the moirocausts as modifications of *thysiai*, increasing the amount of the animal that was burned, or as modifications of holocausts, decreasing what went into the fire? These are questions which certainly require further thought, and which open up for alternative ways of understanding the role of burning of the sacrificial animals, complete or partial, and with or without meat attached to the bones.

Practical experiments

Finally, I would like to return to the holocausts in the "traditional" sense—to kill an animal and burn it whole. Modern scholars have often looked upon this scenario as too complicated, requiring a "veritable inferno of fire". Even Stengel, the "godfather" of the study of Greek animal sacrifice, writing in 1910, thought that holocaustic victims had their intestines removed, and assumed that the burning of complete animals was too impractical or even impossible.[51]

To get a better understanding of holocaustic sacrifices of *whole* animals, an experimental burning was performed at Uppsala in May 2014.[52] All experimental archaeological undertakings have specific goals, but, at the same time, they also raise a number of new questions. It has to be kept in mind that experiments cannot give precise answers, since the ancient setting can never be fully recreated.[53] The result will be suggestions that can provide a better interpretation of the ancient evidence at hand.

Our experiment involved the holocaust of a three-month-old piglet and a six-months-old lamb, two hens, a hedgehog, cattle metatarsals, as well as the burning of cooked meat, fish, eggs, vegetables, grain, nuts, fruit, onions, bread, mushrooms, cheese, wine and other kinds of foodstuffs. The main questions were (1) how much wood was needed to burn the animals and the other items, and how should the pyre be constructed; (2) what happens when an animal is burned whole, unskinned and ungutted—does it explode, smell in a particular way and/or behave in a manner that cannot be understood from the extant ancient sources; (3) how long does it take for the animals to burn completely; and (4) what do the bones look like after the fire has died out and is it possible to discern from the chemical composition of the soil if the animals were intact with the entrails still in place when burned. The first three questions will be addressed here.[54]

To burn an entire animal, a large quantity wood is needed, substantially more than at a *thysia*. This is evident from Greek sacrificial regulations, for example, the expenses at purification sacrifices on Delos, and the recently found inscription from Marmarini in Thessaly even states that if anyone wants to perform a holocaust of a ram, a male sheep or a bird, they have to provide the sufficient amount of wood.[55] At the experimental site, a pyre of dry fir logs, 4 by 2 meters in two levels, was erected (*Fig. 1*).[56] The lower section was reserved for the burning of the cooked food and other foodstuffs, while on top of the higher section were placed the lamb and the pig, the two hens, the cattle metatarsal bones, and the hedgehog.

The construction of the pyre resembled that on Greek vases showing altars, but most of all was modelled on the pyre in the famous representation of King Kroisos about to be burned by Kyrus (*Fig. 2*).[57] This type of construction creates a draft that assures that the fire will not die out and that there will be enough heat.[58] A number of questions immediately arose;

[51] Stengel 1910, 98.

[52] The experiment was a joint venture focusing on Greek ritual practice as well as Scandinavian Iron Age cremation burials. I am very grateful for the collaboration on this project with Frands Herschend, John Ljungqvist, Sofia Prata, Emma Sjöling, Jake Morton, Dan Diffendale and Evy Margaritis, as well as many colleagues and students from the Department of Archaeology and Ancient History at Uppsala University.

[53] For the application of experimental archaeology to zooarchaeology, see Sigvallius' (1994, 15–32) cremation experiments with rabbits, lambs and the head and feet of a bullock; Morton 2015 and Morton in this volume, *Chapter 2*; cf. Lubinski & Shaffer 2010, 241–257. On the use of and approaches to experimental archaeology, see also the contributions in Reeves Flores & Paardekooper 2014. On the methodological implications of autoethnographic investigation of modern religious sacrifice to conceive the sensory impact of ancient animal sacrifice, see Weddle 2013.

[54] The botanical material, zooarchaeological remains, and the soil samples are to be studied in the future.

[55] On the amount of wood listed in inscriptions from Delos suggesting the burning of the animals, see Clinton 2005, 172; *IG* XI.2 199, A lines 70–71 (7 talents of wood = 182 kg, for several large animals, including a bull). For Marmarini, see *CGRN* 225, B lines 67–68 and 71; Parker & Scullion 2016, 252–253.

[56] The kind of wood used in antiquity would presumably be different. Charcoal studies from Greek sanctuaries are still scarce but indicate the use of a variety of woods, such as olive, oak and fig tree (which apparently creates a thick and pungent smoke), see Ntinou 2019, 261–262 (Kalaureia); cf. Kyrieleis 2006, 43, some of the charcoal from the Black Layer at Olympia identified as being oak. Ancient sources occasionally mention the type of wood, e.g. white poplar at Olympia (Paus. 5.13.3). Sigvallius' experiments showed that a mixture of wood from conifers and deciduous trees was optimal (1994, 16–27).

[57] Athenian red-figure amphora by Myson, Paris, Musée du Louvre G 197, early 5th century BC; *BAPD* 202176.

[58] Sigvallius' cremation experiments concluded that this type of "log-house" construction resulted in the most effective pyre (1994, 15).

Fig. 1. Pyre at start of experimental burning, Uppsala, May 2014. Photograph: John Ljungqvist/ Jhonny Therus.

Fig. 2. King Kroisos on the pyre. Attic red-figure amphora by Myson, c. *500–490 BC. Paris, Musée du Louvre, G 197. Photograph © RMN-Grand Palais (Musée du Louvre)/Tony Querrec.*

should the animals be on top of the pyre or surrounded by the wood?[59] This we cannot know, but Greek representations of *thysia* sacrifices show the items being burned while placed on top of the wood, and still clearly visible when the fire is lit; however, this could be an iconographic convention.[60]

The experimental pyre caught fire easily. The initial smoke, actually consisting mainly of water evaporating from the animal bodies, disappeared within *c*. 10 to 15 minutes (*Fig. 3*) and after half an hour there was only an orange-yellow translucent fire in which the items on the pyre were clearly visible (*Fig. 4*). The heat quickly became so intense that the pyre could not be approached. This suggests that at rituals involving a fire of this magnitude, it would be impossible to add something to the pyre by placing it there manually.[61] Any offerings or additional sacrificial victims, whether whole or in parts, would have to be thrown onto the pyre. The Jewish Hellenistic *Letter of Aristeas* (83–120) in fact comments on the skill of the Jerusalem priests who could throw heavy pieces of flesh onto the burning altar without ever missing.[62]

The temperatures of both the pig and the lamb were measured continuously by metal rods inserted into the right hind leg of the pig, *c*. 7 cm into the flesh, as well as into the right hind leg of the lamb, *c*. 5 cm into the flesh, due to this animal being smaller. The temperature was registered every 20 seconds.[63] In the pig, 28 minutes after setting fire to the pyre, the temperature had reached 150° C, leading to the water in flesh and entrails boiling away and the fat and the meat catching fire. Five minutes later, the temperature had risen to 600° C, while after 35 minutes from starting the fire, the temperature had drastically increased, to reach 820° C. The metal rod registering the measurements in the pig fell out six or seven minutes later, since the flesh had contracted due to the heat, which now registered 975° C.

For the lamb the same process occurred, but it was delayed by around 20 minutes, and a temperature of 100° C was not reached until 38 minutes after the fire was started. The fleece of the lamb apparently worked as a fire blanket protecting the body from the heat of the fire (*Fig. 5*).[64] Five minutes later, the

[59] Sigvallius (1994, 15–32), when placing the rabbits both on top of and inside the pyre, found that the latter clearly was most efficient technique.
[60] For the placement of the tail and the thighbones of the sacrificial animal on top of the wood on the altar, see van Straten 1995, 120 and e.g. V178 fig. 126, V185 fig. 130, V186 fig. 131, V191 fig. 125 and V367 fig. 124; Gebauer 2002, 354–355 and 442–443.
[61] See also the calculations by Bergquist 1988, 32, for the difficulties of approaching large fires. For huge ritual pyres, such as the installation on Mt Oite for the cult of Herakles, see Béquignon 1937, 206–208; Verbanck-Piérard 1989, 58, n. 38.
[62] Hultgård 1987, 90.
[63] I want to thank Frans Herschend for processing the data from the temperature measurements and for discussion of the results.
[64] Sigvallius (1994, 25) when experimenting with the cremation of lambs, noted that the wool was transformed into a thick charcoal layer which protected the meat from burning, and that the placement of the rabbits on top of the pyre (instead of inside it) led to the skin forming

Fig. 3. Smoke and steam evaporating from the pyre during the first 10 to 15 minutes after the fire was lit. Photograph: John Ljungqvist/Jhonny Therus.

Fig. 4. The pyre after c. *30 minutes. Photograph: John Ljungqvist/Jhonny Therus.*

body of the lamb reached 730° C, and then the metal rod registering the measurements became separated from the lamb as well. The delay in the effect of the fire on the body of the unflayed lamb could support the argument that holocaustic victims were as a rule skinned, unless they were pigs. On the other hand, the difference in time for the lamb to really catch fire when compared with the pig was fairly small, so skinning may rather have been undertaken for other reasons, such as for preserving the hides as an economical commodity.[65]

After about an hour, it became evident that if the animals were to be completely burned, the wood from the original pyre was not sufficient. Since an overall aim of the experiment was to investigate to what extent the cremation process and the disintegration of the pyre affect the preservation or breakage of the bones, we decided not to stir around in the pyre or move the animals to help the fire.[66] Instead, some logs were added manually, although it was still difficult to come close to the fire due to the intense heat. The trunks of the pig and the lamb still contained considerable parts of the flesh after several hours of burning, although now the meat was carbonized

a charcoal layer which insulated the body from the fire and partly prevented the cremation (1994, 20).

[65] For hides as payment to priests, see Tsoukala 2009, 6–10, or kept by the sanctuary or the city as a source of income, see Jameson 1988, 107–112; Rosivach 1994, 48–64.

[66] Stirring and breaking up of the body quickens the process, as is evident from modern cremation practices in India.

Fig. 5. The pig and the lamb on the pyre after c. *20 minutes. Photograph: John Ljungqvist/ Jhonny Therus.*

Fig. 6. The pyre after c. *one hour. Note the amount of carbonized meat still attached to the bones. Photograph: John Ljungqvist/ Jhonny Therus.*

(*Fig. 6*). After around five hours, the fire was allowed to die out in order for the site to cool off enough for the excavation the following day, and by then most of the meat was gone.

We concluded that the fire was too quick and that it had too little power left when the water had evaporated and the animals finally caught fire. For the meat to be completely burned away, a more consistent fire for a longer time would have been needed, which could be achieved by using a more dense wood burning more slowly and perhaps also a different construction of the pyre, where the animals were covered by the wood. Still, we do not know if a holocaustic sacrifice had to result in the entire animal and all its meat being destroyed by the fire.

The time it took for the bodies to burn and the meat to be destroyed (and not just to catch fire) leads back to the question of to what extent a Greek holocaustic sacrifice meant the complete destruction of the meat of the animals. Judging from the crumbled and cracked stones in the walls of the pits used for holocausts in the Palaimonion, the heat must have been both intense and prolonged, perhaps a suggestion that a successful holocaust meant complete burning.[67] On the other hand, the Palaimonion pits were in use for a long time, *c*. 50 years for

[67] See Broneer 1973, 100–102. In Pit C, the stones had partially been replaced by bricks, which presumably withstood the fire better, but which still became blackened and cracked from the heat.

each one, so that the heat-marks could be indications of successive intense pyres.

At our experiment, the animals were intact when put on the pyre, unskinned and ungutted. When exposed to the intense heat, the bodies swelled but did not explode, something that has been reported from other cremation experiments.[68] The stomachs burst open from the heat, but the contents immediately coagulated and later caught fire. There was no unpleasant smell, even if the carcasses contained inner organs full of residue and dung, only an intense barbecue sensation, like the one noted at previous experiments when burning tails.[69] We may conclude that there seems to have been no practical or esthetic need to gut the animals before burning them. The carcasses stirred in the fire, due to the heat causing contractions of the bodies, and had the pyre been too small they would have fallen off. A pit would certainly have been useful to control the burning remains.

The first impressions of the fire, the smoke, the smell, and the intensity of the heat were extraordinary, but the process took a remarkably long time to complete. That the burning of an entire animal takes time is not only evident from our experiment, but also clear from Plato's description of the holocaust performed by the kings on Atlantis.[70] The bulls to be burned are cut into pieces and put in the fire, and the kings make a libation and swear an oath, after which they have dinner and conduct their necessary business. It is only when darkness finally has arrived, that the sacrificial pyre has died down, and then the kings sit next to the ashes throughout the night.[71]

In antiquity, when a holocaust was performed in connection with a *thysia*, it therefore seems unlikely that the holocaust could have been completely finished, that is, the animal completely consumed by the fire, before the *thysia* was started, or the ritual complex would have lost in momentum when the participants had to stand and watch the fire burn.[72] The time a completed holocaust takes is therefore intriguing. If sheep, goats and cattle were flayed, the intestines removed and the body cut into parts, the process would be quicker, but not very much so, as the same major investment as to time and wood would still be needed in order for the meat to burn.

Why holocausts?

What conclusions may we draw from this experiment in the light of our ancient evidence for burning the body of the sacrificial animal? Skinning and gutting seem to have had only marginal effects on the efficacy of the burning process, so these actions were rather undertaken for ritual or economic reasons. The dominant impression of the experimental holocaust was the time it took to burn the meat. Admittedly, ancient people sacrificing surely had better techniques and the use of different kinds of wood, building the pyre over a pit, and placing the animals inside the pyre all would have improved the efficacy of the fire.

Still, the experiment makes me doubt if the important element at a holocaust was to burn *all* the meat, that is, to make it all disappear in smoke. When holocausts were combined with *thysiai*, could it be that the important action was to start the holocaust, make the water evaporate as smoke and see something happen with the burning bodies, and then the *thysia* could begin and even be concluded while the holocaust still was going on?[73] The essential element of the holocaust may have been to present the animal to the deity and start the fire, which would transfer the offerings to the gods, and, perhaps more importantly, to burn them enough to assure that the meat could not be eaten by the humans present. Once that stage was reached, the pyre could be left to die down by itself. The element *holos* of the holocaust would then not necessarily mean a total annihilation of the meat, but its complete transformation beyond human means of consumption, just as a holocaust did not always have to include the entire animal when the skin had been removed.

If we consider why holocausts were performed, in many cases we do not know, but when there is more information, they often seem to have been confined to particular contexts when a problem had to be dealt with, a kind of crisis management, such as purifications of sanctuaries after the removal of a human corpse.[74] In the *Anabasis* (7.8.4), Xenophon performs a holocaust of piglets to Zeus Meilichios in a pressed situation, when he has run out of money. Pausanias tells the story of how the institution of a holocaustic sacrifice placated the anger of the children who were lynched by a mob in the city of Kaphyai, and whose death had caused crop failure and miscarriages.[75] The burning of the animals apparently removed the problem and solved the difficulties of the situation. Holocausts were also performed to evoke or ritually recognize a

[68] Sigvallius 1994, 20–21.
[69] Personal observation by the author.
[70] Pl. *Criti.* 119e–120b. The term used is *kathagizein*.
[71] Also Leviticus (6:9–10) points to the duration of the *ôlah*, during which the animals are to lie on the altar all night until morning while the fire is kept burning.
[72] One way of handling the extended time of a holocaust would be to perform this ritual on a separate day from the *thysia*, as was the case for the sacrifice to Zeus Machaneus on Kos, see *CGRN* 86, D lines 10–16. On the other hand, this seems to be the only example of such a separation in time in our extant evidence.
[73] A parallel execution of rituals can also be argued for in the case of *trapezomata*, the display of raw body parts for the gods at a *thysia*, an action, which presumably was ongoing while the god's portion was burned on the altar, see Ekroth 2011, 27–28. Also *theoxenia* could have been performed in tandem with *thysia*.
[74] See Ekroth 2017a, 50; 2018, 313–315.
[75] Paus. 8.23.7.

particular aspect of the divine recipient, particularly his or her link to the realm of the dead, as well as to deal with the pollution that death was taken to cause in ancient Greek culture.[76] To handle a crisis and appeal to the dangerous and uncanny side of the recipient often seems to have gone hand in hand with the burning of an entire animal. What seems to be at play here is the fact that the holocaust does not result in a meal. At sacrifices to some divinities, lack of consumption was essential and there was no desire to eat the flesh. The holocaust of a black bull to Boubrostis in Smyrna may have served to avert a crisis in the form of a famine: not to consume the meat from an animal sacrificed to a deity or demon designated "The ravenous appetite" or even "Hunger" appears to conform to a certain logic. To burn the meat enough to make it inedible for the human participants would have both underlined the aim of the ritual and assured its efficacy.

Finally, the link of holocausts in Greek religion with particular contexts of crisis and purification, or aspects of death and pollution in the recipient, may suggest that a prolonged ritual served a specific purpose simply because it took time to deal with such grave matters. A holocaust was perhaps meant to be lengthy, a ritual one had to go through or even "suffer through", to watch and experience for a long time, in order for the ritual to be efficient and fulfil the particular purpose. The time it would take to perform a holocaust can be compared with the brevity of the *hiera kala* at a *thysia*, the most common kind of ritual when communicating with the divine sphere, which seems to have been finished within less than 15 minutes.[77]

To conclude, holocausts, moirocausts and *thysiai* interacted to modify, complement or even exclude each other depending on how the animal's body was handled and what purpose the ritual was meant to achieve. In order to understand this complex pattern, we have to continue to explore the ancient source material in detail, making use of all the evidence at hand, though still respecting the particularities and possibilities of each category of sources. Even then, the ritual reality may still be beyond our grasp.

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[76] Ekroth 2002, 74–128 and 219–221. For the impurity of death, see Parker 1983, 32–48.
[77] This has been shown by the experiments by Jake Morton and Dan Diffendale: see Morton 2015 and also Morton in this volume, *Chapter 2*.

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